

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|--|--|---|
| Applicant's or agent's file reference Z-4707MQ/CB | FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below. | |
| International application No. PCT/IB2008/050286 | International filing date (day/month/year) 25/01/2008 | (Earliest) Priority Date (day/month/year) 25/01/2007 |
| Applicant THE GILLETTE COMPANY | | |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 20
☐ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☒ as selected by this Authority, because this figure better characterizes the invention
b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2008/050286

A. CLASSIFICATION OF SUBJECT MATTER

INV. A46B15/00 A46B9/04 A46B9/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A46B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| X | US 3 230 562 A (BIRCH MARJORIE A) 25 January 1966 (1966-01-25) the whole document ----- | 1-10 |
| X | WO 02/11583 A (GILLETTE CANADA [CA]; BRAUN PHILLIP M [US]; BREDALL WILLIAM A [US]; RO) 14 February 2002 (2002-02-14) the whole document ----- | 1-10 |
| X | US 2004/060136 A1 (GATZEMEYER JOHN J [US] ET AL) 1 April 2004 (2004-04-01) the whole document ----- | 1-10 |
| X | WO 03/055351 A (TRISA HOLDING AG [CH]; FISCHER FRANZ [CH]; STRAEHLER RETO [CH]) 10 July 2003 (2003-07-10) the whole document ----- -/- | 1-10 |

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

6 June 2008

Date of mailing of the international search report

19/06/2008

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Cardan, Cosmin

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2008/050286

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | US 2004/177462 A1 (BROWN WILLIAM R [US] ET AL) 16 September 2004 (2004-09-16) the whole document ----- | 1-10 |
| A | US 2004/154112 A1 (BRAUN PHILLIP M [US] ET AL) 12 August 2004 (2004-08-12) the whole document ----- | 1-10 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2008/050286

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|---|----|---------------------|---|--|
| US 3230562 | A | 25-01-1966 | NONE | |
| WO 0211583 | A | 14-02-2002 | AT 300891 T AU 8109301 A AU 2001281093 B2 BR 0113080 A CN 1449257 A DE 60112454 D1 DE 60112454 T2 EP 1320309 A2 US 6993804 B1 | 15-08-2005 18-02-2002 22-06-2006 24-06-2003 15-10-2003 08-09-2005 30-03-2006 25-06-2003 07-02-2006 |
| US 2004060136 | A1 | 01-04-2004 | AU 2003275314 A1 BR 0314706 A CA 2500187 A1 CN 1700892 A EP 1553891 A1 KR 20050057604 A MX PA05003303 A RU 2313310 C2 WO 2004028398 A1 | 19-04-2004 26-07-2005 08-04-2004 23-11-2005 20-07-2005 16-06-2005 05-07-2005 27-12-2007 08-04-2004 |
| WO 03055351 | A | 10-07-2003 | AT 334610 T AU 2002347125 A1 BR 0215354 A CA 2468340 A1 CN 1607915 A CN 101081123 A DE 10164336 A1 EP 1458261 A1 ES 2269779 T3 JP 2005518829 T KR 20080003464 A MX PA04006236 A NZ 533711 A US 2006137120 A1 US 2003159224 A1 ZA 200403827 A | 15-08-2006 15-07-2003 14-12-2004 10-07-2003 20-04-2005 05-12-2007 17-07-2003 22-09-2004 01-04-2007 30-06-2005 07-01-2008 01-11-2004 28-07-2006 29-06-2006 28-08-2003 12-01-2005 |
| US 2004177462 | A1 | 16-09-2004 | AU 2004222373 A1 BR 0403954 A CA 2485445 A1 CN 1893854 A EP 1603426 A2 JP 2006520238 T JP 2007175525 A JP 2007175526 A KR 20050108316 A MX PA04011102 A US 2007251040 A1 US 2005235439 A1 WO 2004082428 A2 ZA 200408964 A | 30-09-2004 01-03-2005 30-09-2004 10-01-2007 14-12-2005 07-09-2006 12-07-2007 12-07-2007 16-11-2005 14-02-2005 01-11-2007 27-10-2005 30-09-2004 28-06-2006 |
| US 2004154112 | A1 | 12-08-2004 | AU 2004210643 A1 BR 0403942 A CA 2480318 A1 CN 1738560 A | 26-08-2004 01-03-2005 26-08-2004 22-02-2006 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2008/050286

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|---------------------|
| US 2004154112 A1 | | EP 1524928 A1 | 27-04-2005 |
| | | JP 2006517446 T | 27-07-2006 |
| | | KR 20050097454 A | 07-10-2005 |
| | | MX PA04009820 A | 13-12-2004 |
| | | WO 2004071237 A1 | 26-08-2004 |
| | | ZA 200407871 A | 29-06-2005 |
| <hr/> | | | |

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/B2008/050286

International filing date (day/month/year)
25.01.2008

Priority date (day/month/year)
25.01.2007

International Patent Classification (IPC) or both national classification and IPC
INV. A46B15/00 A46B9/04 A46B9/06

Applicant
THE GILLETTE COMPANY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Cardan, Cosmin

Telephone No. +49 89 2399-8115



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/B2008/050286

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper.
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/B2008/050286

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|-------------|
| Novelty (N) | Yes: Claims | |
| | No: Claims | <u>1-10</u> |
| Inventive step (IS) | Yes: Claims | |
| | No: Claims | <u>1-10</u> |
| Industrial applicability (IA) | Yes: Claims | <u>1-10</u> |
| | No: Claims | |

2. Citations and explanations

see separate sheet

Re Item V

1. Document US 3 230 562 A (D1) is considered as the closest prior art and it discloses a toothbrush having a handle, a head, one composite structure comprising a first upstanding element and a second upstanding element connected to the first one, wherein the first element is offset from the second element and an anchor extending from the composite structure (c 2/l 61-61, l 69-71, c 3/l 34-36 and Figs. 9, 10).
Hence, the subject-matter of claim 1 cannot be considered as fulfilling the requirements of Art. 33(2) PCT.
2. The dependent claims do not add any further technical features, to the independent claim they refer to, which are not already disclosed in the prior art cited in the search report and that in combination with those of the claim they refer to could lead to a novel claim.
3. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.
4. Wording like 'herein incorporated by reference' is considered as a general statement which implies that the extent of protection may be expanded in some vague way and hence, not allowable.
5. Wording like 'spirit of the invention' is considered as a general statement which implies that the extent of protection may be expanded in some vague way and hence, not allowable.
6. The unit 'inch' employed in the description is not recognized in international practice, contrary to the requirements of Rule 10.1(d) PCT.
7. Figures 1 to 19 and the description relating thereto do not show/disclose any technical feature relevant to the subject-matter of claim 1 and hence, have no limiting effect. For the sake of clarity these figures and pages of description could be removed.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

| | |
|---|---|
| General information | For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities. |
| Amending claims under Art. 19 PCT | Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220. |
| Filing a demand for international preliminary examination | <p>In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/ WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT).</p> <p>If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).</p> |
| Filing informal comments | After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box. |
| End of the international phase | At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report). |
| Relevant PCT Rules and more information | Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003 |

Jan. 25, 1966

M. A. BIRCH

3,230,562

TOOTH BRUSH AND GUM MASSAGER

Filed July 19, 1963

2 Sheets-Sheet 1

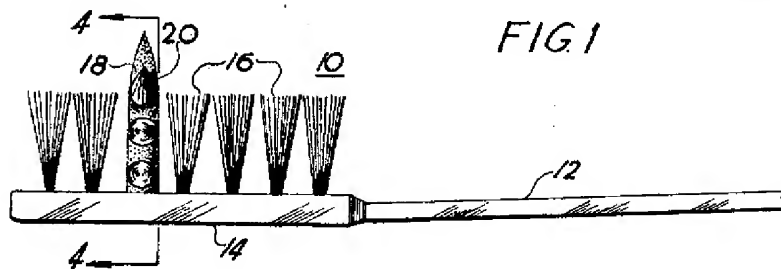


FIG. 1

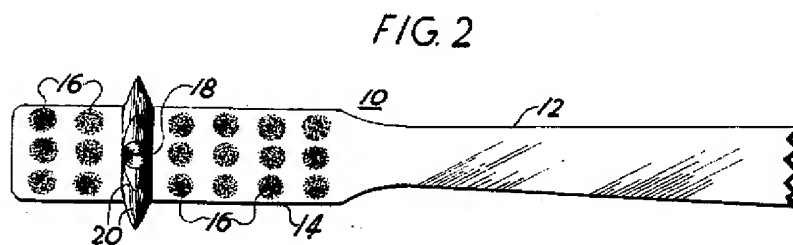


FIG. 2

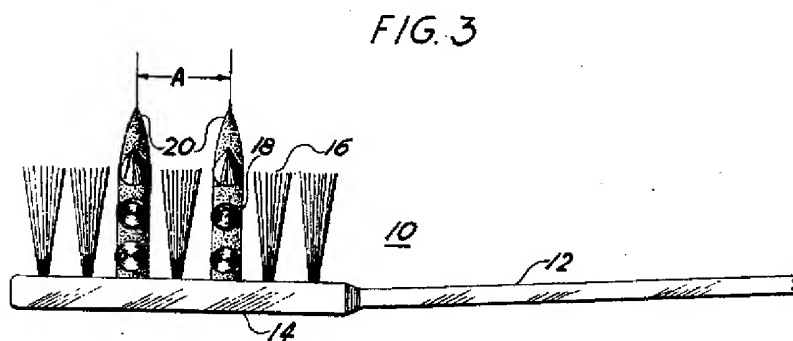


FIG. 3

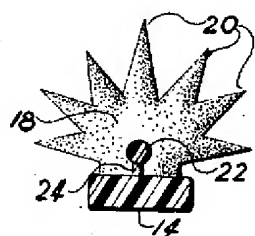


FIG. 4

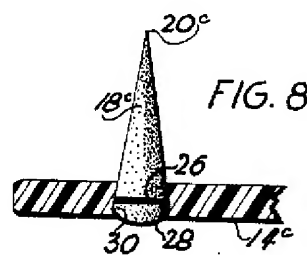


FIG. 8

INVENTOR
MARJORIE ANDERSON BIRCH

BY

John C. Dickman III
AGENT

Jan. 25, 1966

M. A. BIRCH

3,230,562

TOOTH BRUSH AND GUM MASSAGER

Filed July 19, 1963

2 Sheets-Sheet 2

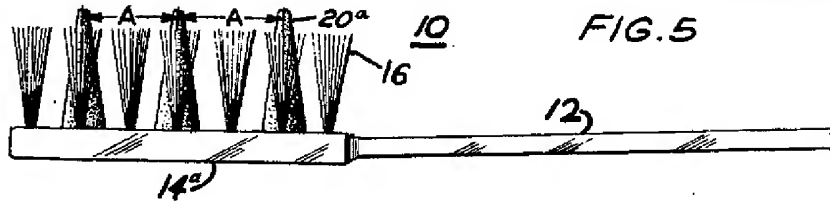


FIG. 7

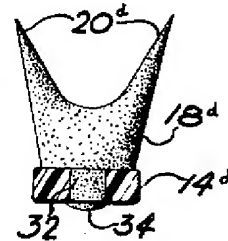
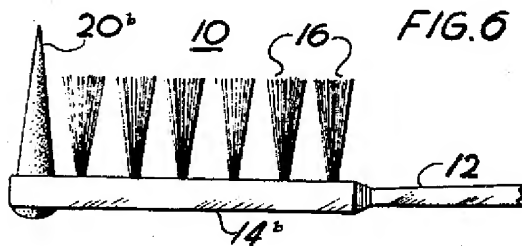
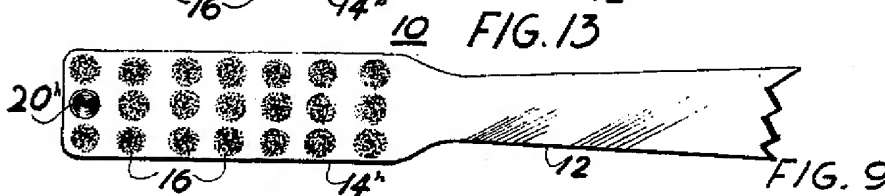
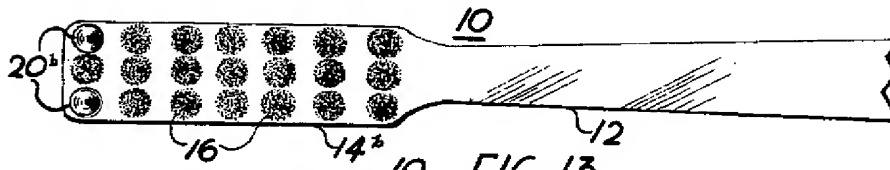


FIG. 11

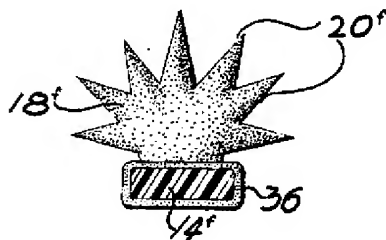


FIG. 12

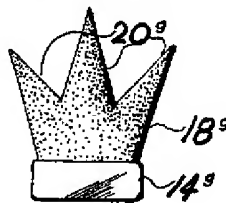
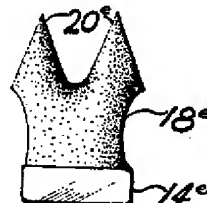


FIG. 10



MARJORIE ANDERSON BIRCH

INVENTOR

BY

John B. Dickman III
AGENT

United States Patent Office

3,230,562

Patented Jan. 25, 1966

1

3,230,562

TOOTH BRUSH AND GUM MASSAGER

Marjorie A. Birch, 225 E. 73rd St., New York, N.Y.

Filed July 19, 1963, Ser. No. 296,171

1 Claim. (Cl. 15-110)

This invention relates generally to articles of oral hygiene and more particularly to tooth cleaning and gum massaging brushes.

Attempts have been made in the past to provide in combination with a tooth brush, a feasible and practical gum massager which will provide effective massaging action while maintaining proper cleaning action of the brush. Such prior attempts included having a gum massaging unit located on the end of the handle opposite the bristles and for use separately therefrom. Other attempts resulted in having gum massaging units placed haphazardly among the bristles to provide the massaging action while the teeth were being cleaned. The former article having the massaging unit separate from the bristles was inadequate in many respects. Primarily such a combination lacked the utility of having the gum massaging means in a position to coact with the bristles while cleaning the teeth. Furthermore, such an arrangement usually provided for only one massaging unit, since more would clutter up the handle and impair the use of the tooth cleaning end of the brush. With only one massaging unit available, only one gum tip could be cleaned at a time.

In the latter combination having the gum massagers placed in adjacent relationship to the bristles, the relative position of the massagers with respect to the bristles was, heretofore, haphazardly selected and adequate cleaning and massaging action was consequently impaired. Furthermore, single massaging units extending perpendicularly from the base of the brush were inadequate upon any slight rotation of the brush with respect to the teeth. It is well known in the art that a tooth brush is rotated in its use so that the bristles will be carried from the edge of the gum surface to the biting edge of the teeth. During such rotational use, the single massaging unit would bend and not provide effective massaging action. Furthermore, if the massaging units were centrally located on the brush base, the brush would have to be inserted far up into the space between the gums and the cheek before the massager could come in contact with the gums to any great extent. Such required use of the brush also resulted in the gums being scraped by the bristles which offset the value of employing the massaging units. The haphazard location of the massaging units also gave inadequate massaging action, since, while one unit would be in position between the teeth to provide massaging action to the gum tip, the others may fall on the surface of the teeth and not on the gums. Such massaging action is further complicated by the above mentioned disadvantage of having the massaging tips centrally located between the bristles. The improper spacing of the massaging units will also interfere with and impair the cleaning action of the bristles. That is, if one massaging unit coincides with a gum tip while another falls on the surface of a tooth, the bristles will not come in contact with that tooth surface and its cleaning will be impaired.

It is, therefore, the primary object of this invention to provide gum massaging means in combination with a tooth brush which will provide optimum massaging and tooth cleaning action simultaneously.

It is another object of the instant invention to provide gum massaging means in combination with a tooth brush which will provide substantial protection to the gums from the coarse scraping action of the bristle.

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Another object of this invention is to provide gum massaging means in combination with a tooth brush which will be effective in a massaging action regardless of any rotation of the brush.

Yet another object of the present invention is to provide a gum massaging means in combination with a tooth brush which will provide effective massaging action to a greater area of the gums.

Still another object of the instant invention is to provide gum massaging means in combination with a tooth brush which will not require the user to force the article far up the sides of the gums to receive effective massaging action therefrom.

And another object of the present invention is to provide a gum massaging means in combination with a tooth brush which will provide massaging action to several adjacent gum tips simultaneously.

These and other objects of the present invention are carried out by the simple and unique structure in combination with a tooth brush which includes having a plurality of tips either independently secured to the base of the brush or arranged in groups on a main body which will be secured to the base. The primary consideration being that, if more than one massaging unit is employed, the distance therebetween must conform substantially to the width of a tooth so that adjacent gum tips are massaged simultaneously. Those tips which are arrayed in groups on a main body are preferably angularly displaced from one another and each group is also spaced from the other by the width of a tooth.

The present invention will be more fully understood, however, from the following detailed description when taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is side elevational view of one embodiment showing the relative position of a gum massager with respect to the bristles;

FIGURE 2 is a top view of the embodiment shown in FIGURE 1 and illustrating the position and distance of the massaging tips from the sides of the brush;

FIGURE 3 is a side elevational view of the preferred embodiment of the instant invention showing a plurality of massaging units spaced from one another;

FIGURE 4 is a sectional view taken along lines 4-4 of FIGURE 1 showing one embodiment of the massager units;

FIGURE 5 is a side elevational view of another embodiment showing single pointed massaging units selectively positioned on the brush body;

FIGURE 6 is side elevational view of still another embodiment showing single pointed massaging units selectively positioned on the brush body, but in a different relationship to each other than those of FIGURE 5;

FIGURE 7 is a top view of the embodiment shown in FIGURE 6 showing one selected position of the massaging units;

FIGURE 8 is a partial sectional view of a massaging unit as shown in either of FIGURES 5, 6, or 7 showing one form of securing the unit to the brush body;

FIGURES 9, 10, 11, and 12 are alternate embodiments and shapes of the massaging unit shown in FIGURE 4 and also showing various forms of securing the massaging units to the brush body; and

FIGURE 13 is an alternate embodiment of the combination shown in FIGURE 7 and contains one central massaging unit in front.

In the various views of the drawings like reference numerals designate similar or identical parts and elements. Referring to the drawings, FIGURE 1 illustrates one embodiment of the invention and shows a tooth brush assembly 10. The tooth brush includes a handle 12, a base 14, and bristles 16. Secured to base 14 is a gum massager

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body 18 having a plurality of tips 20, the uppermost tip extending above the ends of the bristles a predetermined distance which will provide optimum tooth cleaning and gum massaging action. The height of the massager tip also serves to substantially protect the gums from the bristles. The tips 20 also extend beyond the sides of the base 14 a predetermined distance as shown in FIGURE 2. It can be seen from FIGURES 1 and 2 that massaging tips 20 extend radially from massager 18 in such a fashion that optimum massaging action is provided while the brush is rotated to provide a cleaning action on the teeth. As shown and illustrated in FIGURE 3, a plurality of gum massaging units 18 with associated tips 20 may be employed. The primary consideration in such an arrangement, is that the massaging units are separated from one another by a distance A which is the approximate width of a tooth. There is no requirement on the number of massaging units which may be employed in such a configuration as long as the distance between them is held to the dimension A.

FIGURE 4 is a cross sectional view taken along lines 4-4 of FIGURE 1 and shows the radial relationship of tips 20 with respect to one another. This massaging unit may be employed as well in the configuration shown by FIGURE 3. Also illustrated in FIGURE 4 is one means of securing the massaging unit body 18 and base 14. An upstanding support 24 having an enlarged ball portion 22 integral with the head 14 is inserted in a preformed recess in the unit 18.

FIGURE 5 shows another embodiment and illustrates the use of massaging tips 20a secured to base 14a in any suitable manner and at a distance A from one another. The distance A is again to be understood to be the approximate distance of the width of a tooth. The massaging units shown in FIGURE 5 may be of the single pointed ones as shown therein or they may be of the type shown in FIGURES 4, 9, 10, or 11. Furthermore, the single pointed massagers shown could be positioned on the sides of base 14b as shown in FIGURES 6 and 7 and along the length of the base as illustrated in FIGURE 5. This arrangement would protect the gums from the bristles while sustaining adequate massaging action with the use of single pointed massagers.

The embodiment of FIGURES 6 and 7 illustrate the use of two single pointed massagers 20b at the front foremost end of the brush and at opposite corners thereof. In the place of the two single pointed massagers shown, a single unit having a plurality of tips could be employed to perform equally as well or better depending upon which one is preferred. The massaging means being located toward the ends of the bristles provides a positive massaging action when it is required. It is to be understood as described above, that these units could also be employed along the length of the brush and spaced from one another the distance A with the front unit or units being positioned as those of FIGURES 6 and 7.

FIGURE 8 illustrates one manner of securing a single pointed massager 18c having a tip 20c to a base 14c. A hole 26 is provided in the base for receiving the massager 18c and a retaining plug 28. The base 14c includes a lip portion 30 extending into a hole 26 which locks the massager into place. During initial assembly the massager is inserted through hole 26 from the bottom and the retaining plug 28 is snapped therein over lip 30 to provide a positive locking action between the massager and base 14c.

FIGURE 9 illustrates another embodiment of a massager unit 18d. Tips 20d extend above the bristles and beyond the sides thereof to provide all the advantages of the massager of FIGURE 4. Another form of securing massager 18d to base 14d is shown herein and includes a stem portion 32 and a flanged portion 34 integral with body 18d. The flange portion holds body 18d from being withdrawn easily from base 14d.

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FIGURE 10 shows another embodiment of the massager unit 18e on base 14e and differs from that of FIGURE 9 only in design. The tips 20e of the massager shown therein on the base 14e are spaced within the bounds of the sides of the bristles rather than extending beyond them as those of FIGURE 9.

FIGURE 11 shows still another structure for retaining the massager 18f with tips 20f to base 14f. A resilient loop member 36 is integral with body 18f and stretches sufficiently to be pulled over the bristles to be placed on body 14f between the tufts of bristles thereon. With this construction the massager units can be taken off and put on with ease by the user. Various designs of the massager units may be used with the various retaining means shown and is not limited to the combinations shown in the drawings.

FIGURE 12 is still another embodiment of the massaging unit design. This shows a slightly different arrangement of the tips 20g on the massager 18g. The massager 20 is attached to the base 14g in any of the aforementioned ways. With this design the gums will receive complete massaging action during rotation of the brush with respect to the teeth.

FIGURE 13 is another embodiment of the structure illustrated in FIGURE 7 and includes a single massaging point 20 surrounded on three sides by bristles 16.

Obviously numerous modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described therein. Therefore, the exemplifications shown and described in the detailed description may be varied in accordance with one's desires without departing from the spirit of the instant invention or the scope of the appended claim.

What is claimed is:

In combination with a tooth cleaning brush having a handle and a longitudinally extending head with longitudinally and transversely spaced tufts of bristles carried thereby and extending therefrom, gum massaging means comprising massager bodies attached to said head and extending transversely between adjacent tufts of bristles, a plurality of massaging tips formed on said massager bodies and extending radially upwardly and outwardly from each of said massager bodies, the uppermost of said tips extending substantially above the tops of said bristles, each of said tips on each of said bodies being angularly displaced with respect to the other of said tips thereon, the free ends of each of said tips on each body being in the same plane as the corresponding tips on the other of said bodies, the longitudinal spacing of the tips on each body from the corresponding tips on the adjacent body being approximately the width of a tooth.

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DANIEL BLUM, *Primary Examiner*.

CHARLES A. WILLMUTH, *Examiner*.

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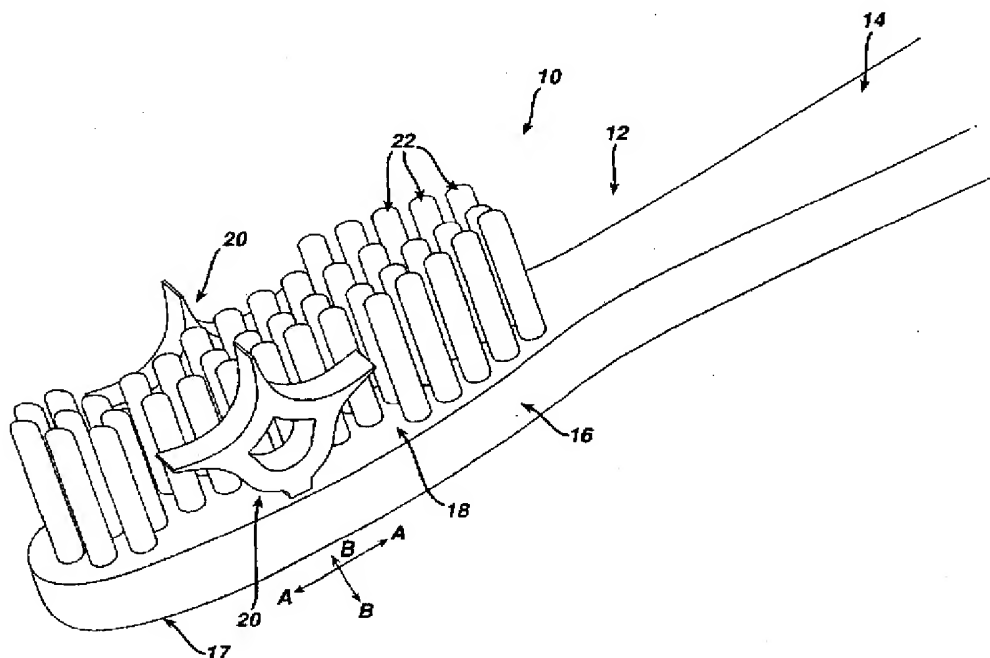
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- (71) Applicant (for all designated States except US):
GILLETTE CANADA COMPANY [CA/CA]; 4 Robert Speck Parkway, Mississauga, Ontario L4Z 4C5 (CA).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): **BRAUN, Phillip, M.** [US/US]; 128 Beechwood Hill Trail, Exeter, RI 02822 (US). **BREDALL, William, A.** [US/US]; 257 Marvilla Circle, Pacifica, CA 94044 (US). **ROBERTS, Michael [IE/US]**; 12 Apache Drive, Brookfield, CT 06804 (US). **MASTERMAN, Thomas, Craig** [US/US]; 264 Henry Street, San Francisco, CA 94114 (US).
- (74) Agents: **GALLOWAY, Peter, D.** et al.; Ladas & Parry, 26 West 61st Street, New York, NY 10023 (US).
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(54) Title: **ORAL CARE DEVICES**



(57) Abstract: Oral devices are provided, including oral brushes that include bristle tufts and a rocking member having radially extending protrusions constructed to penetrate between a user's teeth. The protrusions are shaped to penetrate the interproximal region, cleaning between a user's teeth and stimulating the gums.

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ORAL CARE DEVICES

Conventional toothbrushes, having tufts of bristles mounted on a head, are generally effective at removing plaque from the flat surfaces of teeth and the areas between teeth and along the gumline that can be accessed by the bristles.

5 However, such toothbrushes typically cannot clean interproximal and sub-gingival areas where tufts of bristles are unable to penetrate or reach. (The term "interproximal" refers to the areas between the teeth of a mammal). This is because the bristles tend to pass or flick over the gaps between the teeth and are usually physically impeded from reaching behind the interdental papillae and below the
10 gumline. To clean these areas (col and sub-gingival areas), it is generally necessary to floss between the teeth with dental floss.

While flossing effectively cleans the supra-gingival and sub-gingival regions between teeth, most people do not floss regularly. Failing to floss regularly may result in gingivitis, which can lead to more serious gum diseases. These
15 problems can occur despite regular toothbrushing.

The invention features oral devices, such as oral brushes, that are capable of providing interproximal and sub-gingival cleaning and/or gingival stimulation. It is believed that these oral brushes provide clinical benefits, e.g., reduction of gingivitis, to users who do not floss regularly but who do use the oral
20 brush regularly, relative to the benefits provided by using a conventional toothbrush with the same regularity without flossing.

In one aspect, the invention features an oral device that includes a body having a head that is shaped for insertion into the oral cavity, and one or more rocking elements, mounted on the head, each rocking element including a central
25 portion and a plurality of protrusions extending radially from the central portion. The rocking or pivoting motion of the rocking element(s) typically allows interproximal penetration and/or gum stimulation to be achieved using the user's normal brushing motion.

Preferred embodiments may include one or more of the following
30 features. The rocking element is mounted in a slot in the head of the oral device. The slot is shaped and sized to allow rocking of the rocking element in one direction, while restricting the rocking element from moving in a perpendicular

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direction. The protrusions of the rocking element taper from a relatively wide base to a relatively narrow tip. The tips are shaped to penetrate the interproximal and subgingival regions of the oral cavity. The tips are preferably less than 0.070 inches wide, more preferably from about 0.005 to 0.025 inches. The rocking
5 element has a thickness of less than 0.200 inches, more preferably 0.050 to 0.125 inches, and most preferably 0.080 to 0.100 inches. The rocking element has an overall diameter less than 1.000 inches, more preferably 0.500 to 0.700 inches, and most preferably 0.550 to 0.650 inches. The rocking element is formed of a material having a durometer reading of from about 20 to 90 Shore A, more preferably 40 to
10 80 Shore A. The central portion of the rocking element includes an opening therethrough, sized to allow the rocking element to collapse and conform to a user's tooth shape during use. The rocking element is co-molded with the head of the oral care device, or, alternatively, the rocking element includes a mounting element sized to mount into a hole in the head of the oral care device. The mounting element acts
15 as a fulcrum for the rocking movement of the rocking element. The central portion of the rocking element is spherical. The protrusions are located on the upper hemisphere of the spherical central portion. The protrusions are spaced less than 90 degrees apart, more preferably 65 to 80 degrees apart. The protrusions are generally cylindrical. The protrusions have a base diameter of 0.100 inches, more
20 preferably 0.010 to 0.100 inches, and most preferably 0.040 to 0.060 inches. The protrusions have a length less than 0.100 inches, more preferably 0.050 to 0.175 inches, and most preferably 0.070 to 0.080 inches. The spherical central portion has a diameter less than 0.300 inches, more preferably 0.100 to 0.0300 inches, most preferably 0.200 to 0.250 inches.

25 In another aspect, the invention includes an oral brush that includes a body having a head shaped for insertion into the oral cavity, tooth cleansing elements extending from a top surface of the head, and one or more rocking elements mounted on the head, each rocking element including a central portion and a plurality of protrusions extending radially from the central portion, the protrusions
30 tapering from a relatively wide base to a relatively narrow tip, the tips being sized and shaped to penetrate the interproximal and subgingival regions.

The invention also features methods of using the above-described oral

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brushes. In one method, the oral device is inserted into the oral cavity and the user brushes the teeth with the oral brush. Preferably, the teeth are brushed with a motion that causes the protrusions to penetrate into the interproximal region and stimulate the gums.

5 Other features and advantages of the invention will be apparent from the description and drawings, and from the claims.

FIG. 1 is a perspective view of an oral brush according to one embodiment of the invention.

10 FIG. 2 is a perspective view of an oral brush according to an alternate embodiment of the invention. The bristles are omitted for clarity.

FIGS. 3-6 are perspective views of rocking elements according to alternate embodiments of the invention. FIGS. 3A and 3B are front and side views of a rocking element according to an embodiment of the invention. FIG. 4A is a schematic view of a rocking element in use according to an embodiment of the invention. FIGS. 5A and 5B are schematic perspective views of rocking elements according to alternate embodiments of the invention. FIG. 6A is a perspective view of an oral brush according to an alternate embodiment of the invention. FIG. 6B is a perspective view of an alternative embodiment of the rocking element shown in FIG. 6.

20 FIGS. 7 and 7A are a cross-sectional views of an oral brush according to one embodiment of the invention.

Referring to Figs. 1 and 2, an oral brush 10 includes a body 12 that defines a handle 14 and a head 16. Head 16 includes a top surface 18 having a plurality of apertures 26 (Fig. 2) that are constructed to receive tooth cleansing elements, such as tufts of bristles 22 (Fig. 1) and a bottom surface 17. A pair of rocking elements 20 are mounted on the head 16 on the top surface 18, towards the outer edges of the head 16. Each rocking element 20 is constructed to rock back and forth during brushing, generally in the direction indicated by arrows AA, to penetrate the interproximal region and stimulate the gums, as will be discussed further below.

30 The rocking elements 20 can be mounted flush with the top surface 18 (Fig. 1), or in wells 24 formed in the head 16 (Fig. 2). Each well 24 is

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generally shaped to provide lateral support to the rocking element 20 so as to facilitate the rocking motion in the direction of arrows AA and prevent excessive lateral movement, i.e., movement in the direction of arrows BB (Fig. 2). Thus, the sidewalls 27 of the well 24 will restrict movement of the rocking element 20 in a direction perpendicular to the direction of the rocking motion. The width of the well 24 will depend on the thickness of the rocking element 20. The clearance between sidewalls 27 and the face surfaces 33 of the rocking element should be sufficient to allow the rocking element 20 to rock freely, while constraining the rocking element 20 in a direction perpendicular to the rocking plane. Generally, the clearance is from about 0.010 to 0.050 inches.

Referring to FIGS. 3, 3A and 3B, rocking element 20 includes a central region 30, and, extending radially from the central region 30, a plurality of protrusions 31. The protrusions 31 taper from a relatively wide base 34 to a narrow tip 32. The protrusions 31 may also be substantially straight throughout (not shown). Because the tips 32 are relatively thin, as the rocking element 20 passes over the teeth, the tips 32 will penetrate into the interproximal regions. Side surfaces 36 will rub against and clean the teeth in the interproximal region, and face surface 33 will tend to contact the gums, resulting in massaging and cleaning of the supragingival area.

Central region 30 is generally circular with the three protrusions 31 being spaced about the upper half of the central region 30 to generally correspond to the spacing of human teeth. The protrusions 31 are substantially equal in their dimensions, and the tips 32 generally define a circle. The diameter of the circle is preferably less than 1.000 inches, more preferably from about 0.500 to 0.700 inches, and most preferably from about 0.550 to 0.650 inches. The side surfaces 36 each define an arc having a radius of curvature R of from about 0.150 to 0.175. The effective tip length that will penetrate between two adjacent teeth is from about 0.025 to 0.150 inches. The tips 32 taper to a width W of less than 0.070, more preferably from about 0.005 to 0.025 inches. It is noted that each tip 32 is tapered to a thickness that is less than the thickness that would be dictated by the radius of curvature R . That is, following the curve dictated by R would result in the protrusion 31 becoming undesirably wider towards the tip 32. Therefore, a portion

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of side surface 36 tapers linearly to the tip 32, shown in FIG. 3A at 37. The rocking element 20 has a thickness T (Fig. 3B) of less than 0.200 inches, more preferably from about 0.050 to 0.125 inches, and most preferably from about 0.080 to 0.100 inches.

5 During brushing, the rocking element 20 will rock back and forth, with mounting shaft 40 as its fulcrum (described in detail below), until it contacts camming surface 38. Camming surface 38 will contact either the top surface 18, if no well 24 is used, or the well bottom 25, when a well 24 is used. The camming surface 38 is shaped to allow the desired rocking distance. Varying the shape of the
10 camming surface or adding detents to the camming surface can control the amount of rocking. The shape of the well bottom 25 can also control the amount of rocking, when a well 24 is used.

FIG. 4 shows an alternate rocking element 120. The rocking element 120 includes an opening 50 extending through the thickness of the rocking element
15 120 in the central region 30. The opening 50 is sized and shaped to allow the rocking element 120 to collapse (due to the resilient nature of the elastomeric material used to form the rocking element 120) and thereby conform to a user's teeth 100. As shown in Fig. 4A, the rocking element 120 will collapse under
20 normal brushing pressure, causing the tips 32a, 32b to be urged towards the tip 32c that is within the interproximal region. Side surfaces 36 then wrap around the teeth 100, and a portion of the side surfaces 36 penetrate into the interproximal region (FIG. 4A). This wrapping action will help clean between the teeth 100 and polish the outer surface of the teeth 100. The opening 50 is generally sized to allow the
25 rocking element 120 to collapse under normal pressure, while maintaining lateral stiffness.

FIG. 5 shows another alternate rocking element 220. Bristles 60 extend from the tips 32 to facilitate better penetration into the interproximal region. The added length provided by the bristles will cause deeper penetration into the interproximal region, allowing more thorough cleaning. The bristles may be
30 co-molded with the rocking element, or joined to the rocking element in any suitable manner. Further, the bristles 60 may be standard toothbrush bristles, plastic elements or rubber elements. The length of the bristles 60 is preferably less than

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0.150, more preferably from about 0.025 to 0.150, most preferably from about 0.025 to 0.075 inches. The diameter of the bristles 60 is preferably less than 0.012, more preferably from about 0.002 to 0.010 inches. The spacing between the bristles 60 is from about 0.010 to 0.100 inches.

5 FIG. 5A shows another alternative rocking element 420. The protrusions 31 are diamond shaped in cross section. The protrusions 31 taper in two dimensions from a relatively wide base 34 to a relatively narrow tip 32. This "double taper" provides a protrusion with angled surfaces capable of wedging between a user's teeth. The geometry and benefits of such a shape for the protrusions 31 is described in U.S. Patent Application Serial No. 09/573,576, 10 entitled "Oral Devices," filed on May 18, 2000, assigned to The Gillette Company, assignee of the present invention, and incorporated herein by reference.

 FIG. 5B shows another alternative rocking element 520. The protrusions 31 are triangular shaped in cross section. The protrusions 31 taper in 15 two dimensions from a relatively wide base 34 to a relatively narrow tip 32. This "double taper," as described above, is capable of wedging between a user's teeth. The geometry and benefits of such a shape for the protrusions 31 is described in U.S. Patent Application Serial No. 09/573,576, incorporated by reference above.

 FIG. 6 shows another alternate rocking element 320. The rocking 20 element 320 is more omnidirectional than the rocking elements described above, resulting in easier use during circular brushing. The rocking element 320 includes a spherical body 70 and, extending radially from the upper hemisphere of the spherical body 70, a plurality of protrusions 72. The protrusions 72 taper from a generally cylindrical base 74 to a hemispherical tip 76. The protrusions 72 are 25 shaped and sized to penetrate into the interproximal region. The rocking element 320 rocks on the lower hemisphere of the spherical body 70, pivoting around mounting shaft 40 (described in detail below). The hemispherical shape allows for a rocking movement in all directions. Therefore, a well 24 would generally not be used with this embodiment. The diameter of the spherical body 70 is preferably 30 less than 0.300 inches, more preferably from about 0.100 to 0.300 inches, and most preferably from about 0.200 to 0.250 inches. The protrusions 72 have a length L that is preferably less than 0.200 inches, more preferably from about 0.050 inches to

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0.175 inches, and most preferably from about 0.070 to 0.080 inches. The cylindrical base 74 of the protrusions 72 have a diameter D that is preferably less than 0.100 inches, more preferably from about 0.010 inches to 0.100 inches, and most preferably from about 0.040 to 0.060 inches. The tips 76 of the protrusions 72 may be hemispherical (Fig. 6) or conical (Fig. 6B). The radius of curvature R2 for the hemispherical tip 76 is preferably 0.050 inches, more preferably from about 0.010 to 0.040 inches, and most preferably from about 0.010 to 0.025 inches. The taper angle A for the conical tip 76 (Fig. 6B) is preferably 75 degrees, more preferably from about 30 degrees to 60 degrees, and most preferably from about 40 to 50 degrees. The protrusions 72 are spaced about the spherical body 70 at regularly spaced angles S. The angle S is preferable less than 90 degrees, most preferably from about 65 degrees to 80 degrees.

The preferred rocking elements shown in Figs. 3-6 also include a mounting shaft 40 that includes a resilient protrusion 44. One suitable technique for mounting the rocking element 20 on the oral brush 10 is by an interference fit between protrusion 44 and the bottom surface 17 of head 16, as shown in FIG. 7A. As shown in Fig. 7, the mounting shaft 40 is pulled through a bore 48 in the head 16 having a diameter smaller than the protrusion 44, temporarily compressing the protrusion 44. Protrusion 44 is held in place by an interference fit when the protrusion 44 expands to its normal size upon exiting the bore (Fig. 7A). The portion 46 of mounting shaft that extends beyond the protrusion is trimmed flush with the head 16. Alternatively, the protrusion 44 could be set into a countersink (not shown) in the head 16.

In the mounting arrangement shown in Fig. 7A, the mounting shaft 40 is the fulcrum of the rocking element 20. The diameter of mounting shaft 40 is generally from about 0.060 to 0.070 inches. The diameter of protrusion 44 is generally from about 0.080 to 0.090 inches. In production, the rocking element 20 may be mounted by insert molding the rocking element 20 into the head 16 of the oral device 10. Insert molding would eliminate the need for a through bore 48 in the head 16. Instead, the mounting shaft 40 would be embedded in the head 16 during the molding of the body 12.

The rocking element 20 can be mounted in the center of the head 16

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if a single rocking element 20 is used. In embodiments with more than one element, the rocking elements 20 may be mounted towards the sides of the head 16. Alternatively, the rocking elements 20 may be mounted towards the midpoint of the head 16 or towards the front of the head 16.

5 Suitable materials for the rocking element 20 include those that are safe for use in the oral cavity and which have suitable mechanical properties. The material used to form rocking element 20 is preferably relatively soft and flexible, to avoid user discomfort and to allow the tips 32 to flex during brushing to better penetrate the interproximal region. The material should also be strong and flexible
10 to allow the mounting shaft 40 to flex and allow the rocking member 20 to rock. Preferably, the material has a durometer reading of from about 20 to 90 Shore A, most preferably about 40 to 80 Shore A. To obtain these properties, the rocking elements 20 are preferably formed of a thermoplastic elastomer. Suitable thermoplastic elastomers include, e.g., KRATON-type rubber-based block
15 copolymers such as DYNAFLEX G2701 and DYNAFLEX G2755 polymers, commercially available from GLS Corporation, Cary, Illinois. The tips 32 can be co-molded with the rest of the rocking element 20, allowing the rest of the rocking element 20 to be formed of a different material. In this case, the tips 32 can be formed of a relatively softer material. Suitable tip materials include KRATON-type
20 rubber-based block copolymers having a hardness of about 50-90 Shore A, e.g., DYNAFLEX G2780 polymer.

Texture can be added to the rocking elements 20 to facilitate better cleaning, such as scraping plaque off the teeth. The texture can be added by molding texture directly into the entire rocking element 20 or the protrusions 31 and
25 72. Texture can also be achieved by the addition of an abrasive to the base material used to make the rocking elements 20.

Other embodiments are within the claims. For example, one or more rocking elements may be used on an oral care device without cleansing elements. Such a device can be used to clean and massage the gums and interproximal region,
30 with a conventional toothbrush being used separately to clean the teeth. Rocking elements may also be mounted on the body 10 at the end of handle 14 that is opposite the head 16. Further, the oral brush 10 could include only one rocking

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element, or more than two rocking elements 20.

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CLAIMS

1. An oral care device comprising:
a body having a head shaped for insertion into the oral cavity, and
a rocking element mounted on the head, the rocking element
5 including a central portion and a plurality of protrusions extending radially from the
central portion.
2. The oral care device of claim 1, wherein the protrusions taper from a
relatively wide base to a relatively narrow tip.
3. The oral care device of claim 1, further comprising tooth cleansing
10 elements extending from a top surface of the head.
4. The oral care device of claim 1, wherein the head includes a slot for
mounting the rocking element, the slot shaped to allow the rocking element to rock
back and forth as the oral care device is used.
5. The oral care device of claim 4, wherein the slot is sized to support
15 the rocking element in a direction perpendicular to the direction of rocking, thereby
restricting movement of the rocking element in the perpendicular direction.
6. The oral care device of claim 1, wherein the tips are shaped to
penetrate the interproximal and subgingival regions of the oral cavity.
7. The oral care device of claim 1, wherein the tips have a width of less
20 than 0.070.
8. The oral care device of claim 1, wherein the tips have a width of
from about 0.005 to 0.025 inches.
9. The oral care device of claim 1, wherein the rocking element has a
thickness of less than 0.200 inches.
- 25 10. The oral care device of claim 1, wherein the rocking element has a
thickness of from 0.050 to 0.125 inches.
11. The oral care device of claim 1, wherein the rocking element has a
thickness of from 0.080 to 0.100 inches.
12. The oral care device of claim 1, wherein the rocking element has an
30 overall diameter less than 1.000 inches.
13. The oral care device of claim 1, wherein the rocking element has an
overall diameter of from 0.500 to 0.700 inches.

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14. The oral care device of claim 1, wherein the rocking element has an overall diameter of from 0.550 to 0.650 inches.
15. The oral care device of claim 1, wherein the rocking element is formed of a material having a durometer reading of from about 20 to 90 Shore A.
- 5 16. The oral care device of claim 1, wherein the rocking element is formed of a material having a durometer reading of from about 40 to 80 Shore A.
17. The oral care device of claim 1, wherein the central portion further includes an opening therethrough sized to allow the rocking element to conform to a tooth's shape during use.
- 10 18. The oral care device of claim 1, wherein each protrusion has a double taper from a relatively wide base to a relatively narrow tip.
19. The oral care device of claim 18, wherein each protrusion is generally diamond-shaped in cross section.
20. The oral care device of claim 18, wherein each protrusion is
- 15 generally triangular in cross section.
21. The oral care device of claim 1, wherein the rocking element is co-molded with the head.
22. The oral care device of claim 1, wherein the rocking element further comprises a mounting element sized to mount into a hole in the head.
- 20 23. The oral care device of claim 1, further comprising a second rocking element.
24. The oral care device of claim 1, wherein the central portion is spherical.
25. The oral care device of claim 24, wherein the protrusions are located
- 25 on the upper hemisphere of the central portion.
26. The oral care device of claim 24, wherein the protrusions are spaced less than 90 degrees apart.
27. The oral care device of claim 24, wherein the protrusions are spaced from about 65 to 80 degrees apart.
- 30 28. The oral care device of claim 24, wherein the protrusions are cylindrical.
29. The oral care device of claim 24, wherein the protrusions have a base

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diameter less than 0.100 inches.

30. The oral care device of claim 24, wherein the protrusions have a base diameter from about 0.010 inches to 0.100 inches.

31. The oral care device of claim 24, wherein the protrusions have a base
5 diameter from about 0.040 inches to 0.060 inches.

32. The oral care device of claim 24, wherein the protrusions have a length less than 0.100 inches.

33. The oral care device of claim 24, wherein the protrusions have a length of from about 0.050 inches to 0.175 inches.

10 34. The oral care device of claim 24, wherein the protrusions have a length of from about 0.070 inches to 0.080 inches.

35. The oral care device of claim 24, wherein the spherical central portion has a diameter less than 0.300 inches.

36. The oral care device of claim 24, wherein the spherical central
15 portion has a diameter from about 0.100 inches to 0.300 inches.

37. The oral care device of claim 24, wherein the spherical central portion has a diameter from about 0.200 inches to 0.250 inches.

38. The oral care device of claim 24, wherein the movement of the rocking element during brushing is substantially omnidirectional.

20 39. The oral care device of claim 1 or 24, wherein the rocking element further comprises a shaft, mounted on the central portion to act as a fulcrum for rocking movement of the rocking element.

40. An oral care device comprising:

25 a body having a head shaped for insertion into the oral cavity;
a rocking element mounted on the head, the rocking element including a central portion and a plurality of protrusions extending radially from the central portion, the protrusions tapering from a relatively wide base to a relatively narrow tip, the tips being shaped and sized to penetrate the interproximal and subgingival region.

30 41. A method of oral hygiene comprising:

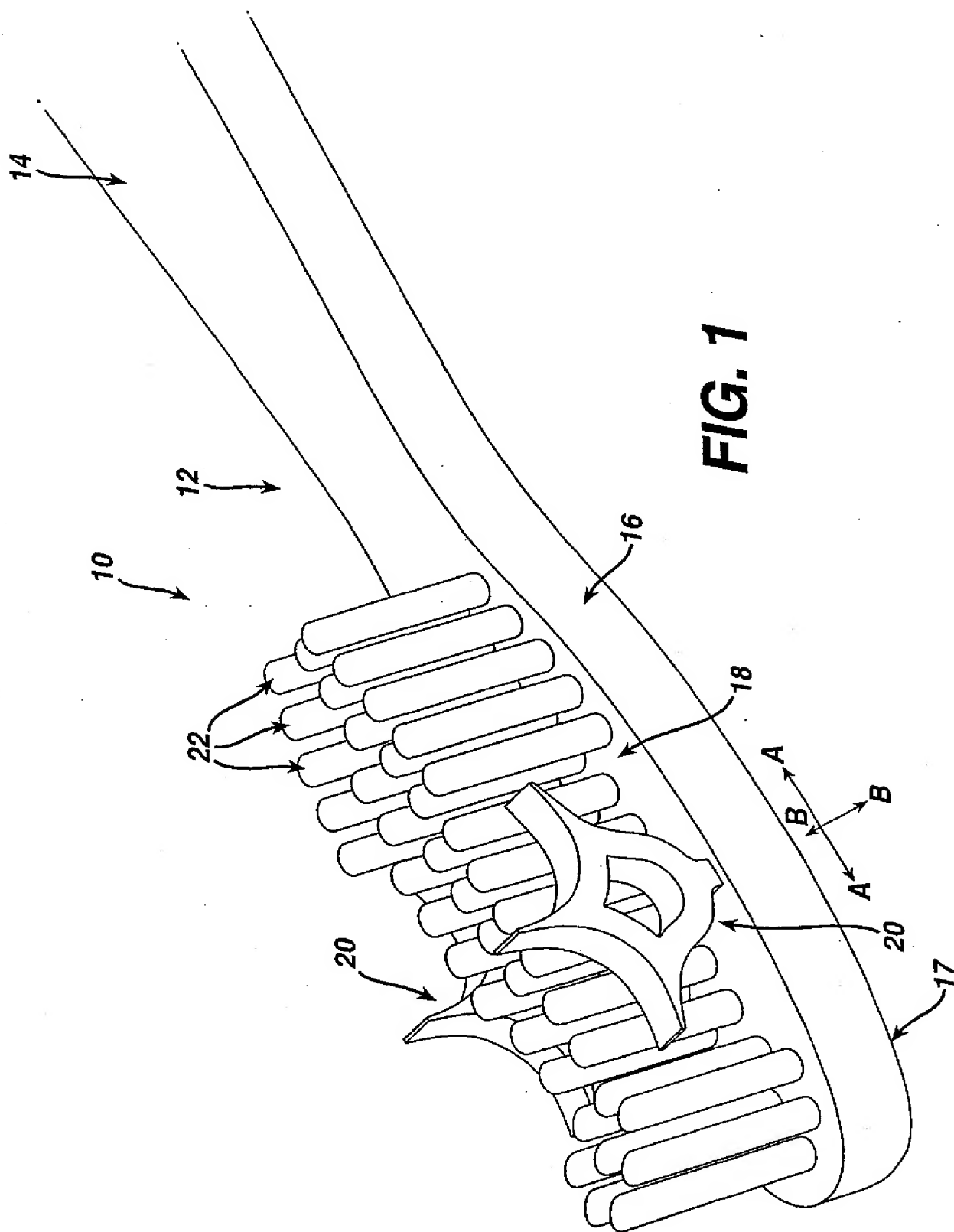
inserting into the oral cavity of a human an oral brush that comprises a body having a head, tooth cleansing elements extending from a top surface of the

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head, and a rocking element mounted on the head, the rocking element including a central portion and a plurality of protrusions extending radially from the central portion; and

brushing the teeth with the oral brush.

- 5 42. The method of claim 41, wherein the brushing step comprises using a motion that causes the protrusions to penetrate between adjacent teeth, resulting in interproximal penetration and gum stimulation.



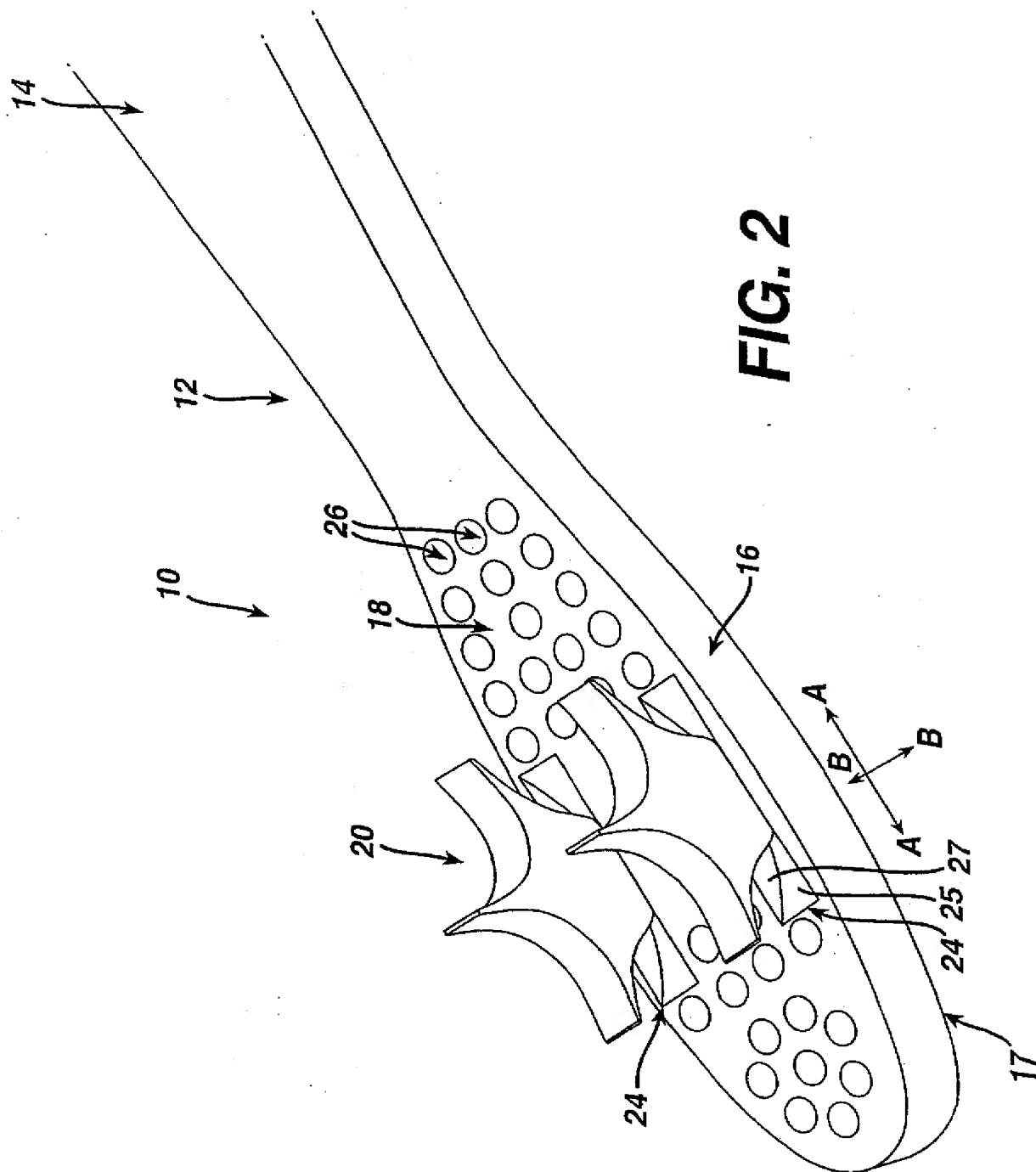


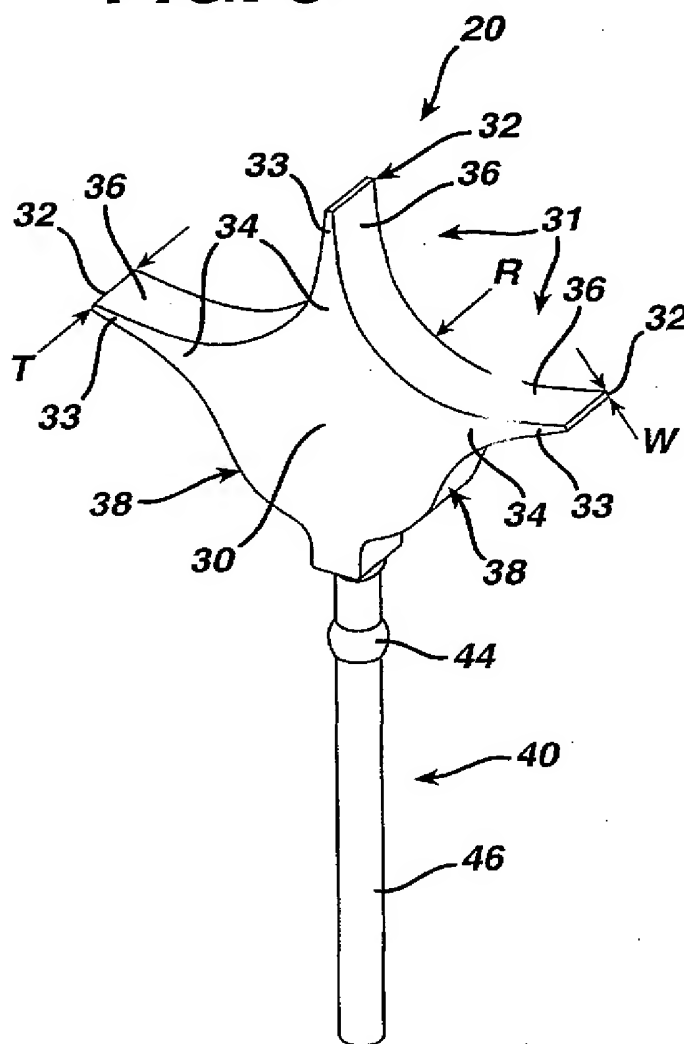
FIG. 3

FIG. 3B

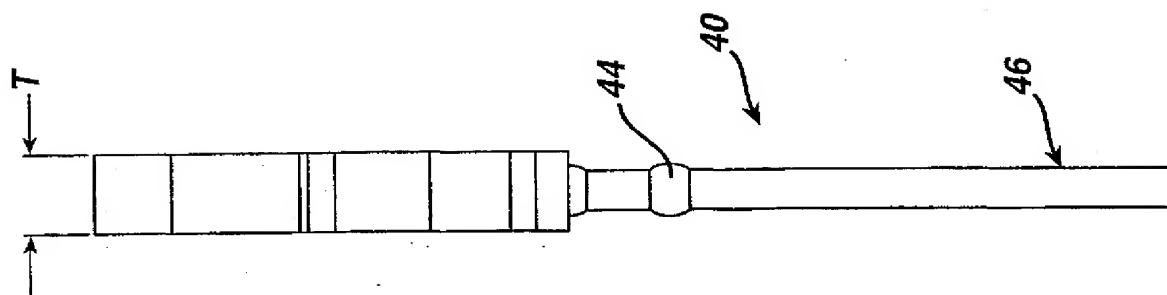
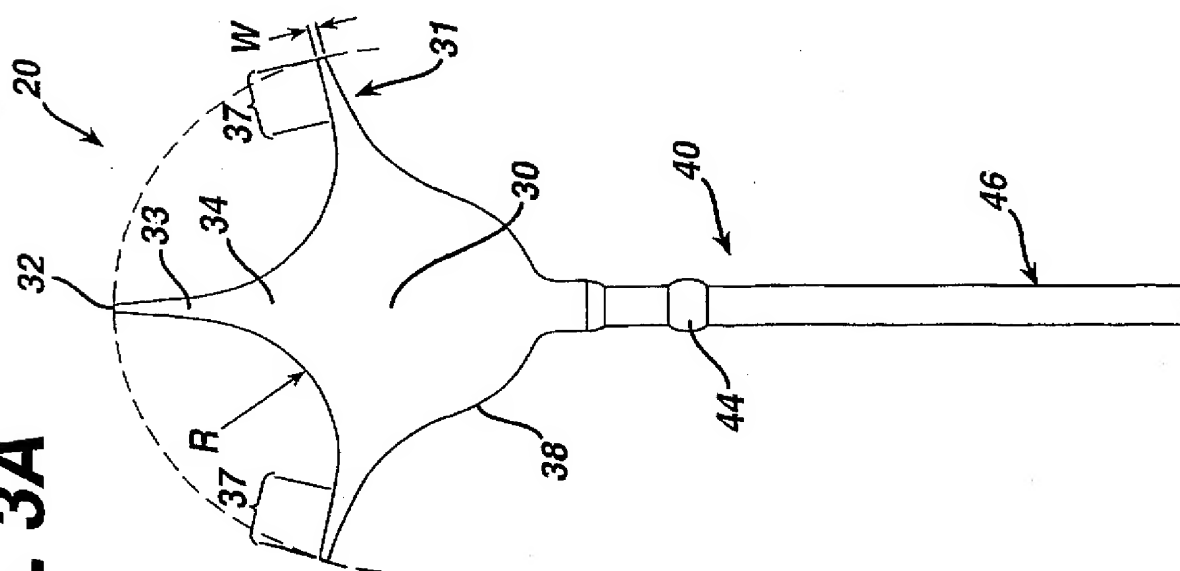
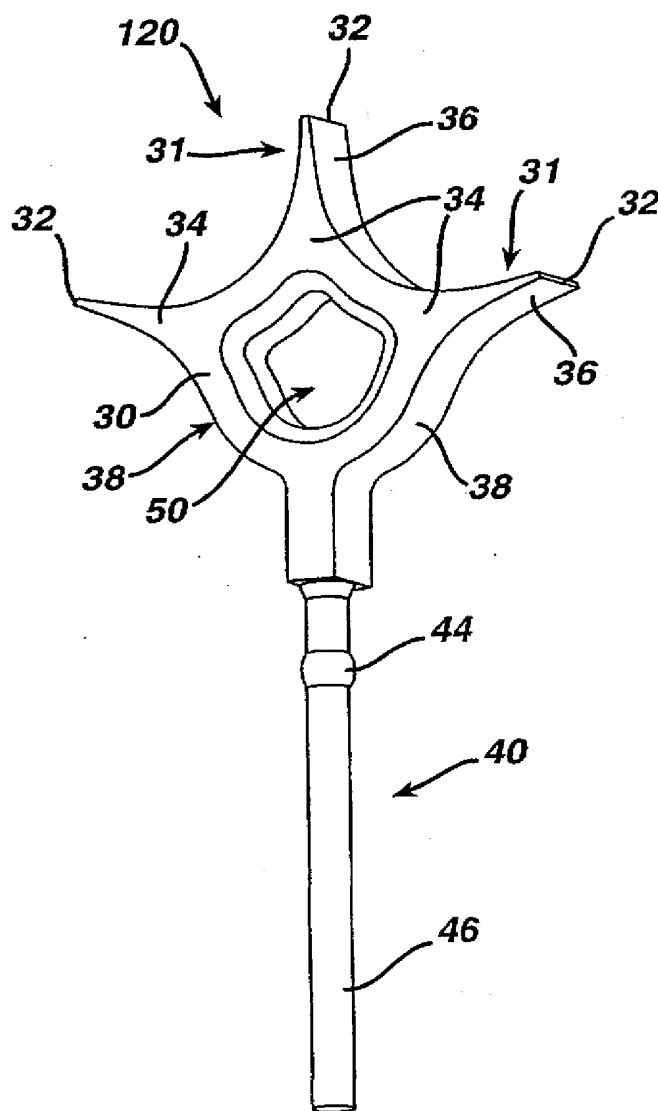


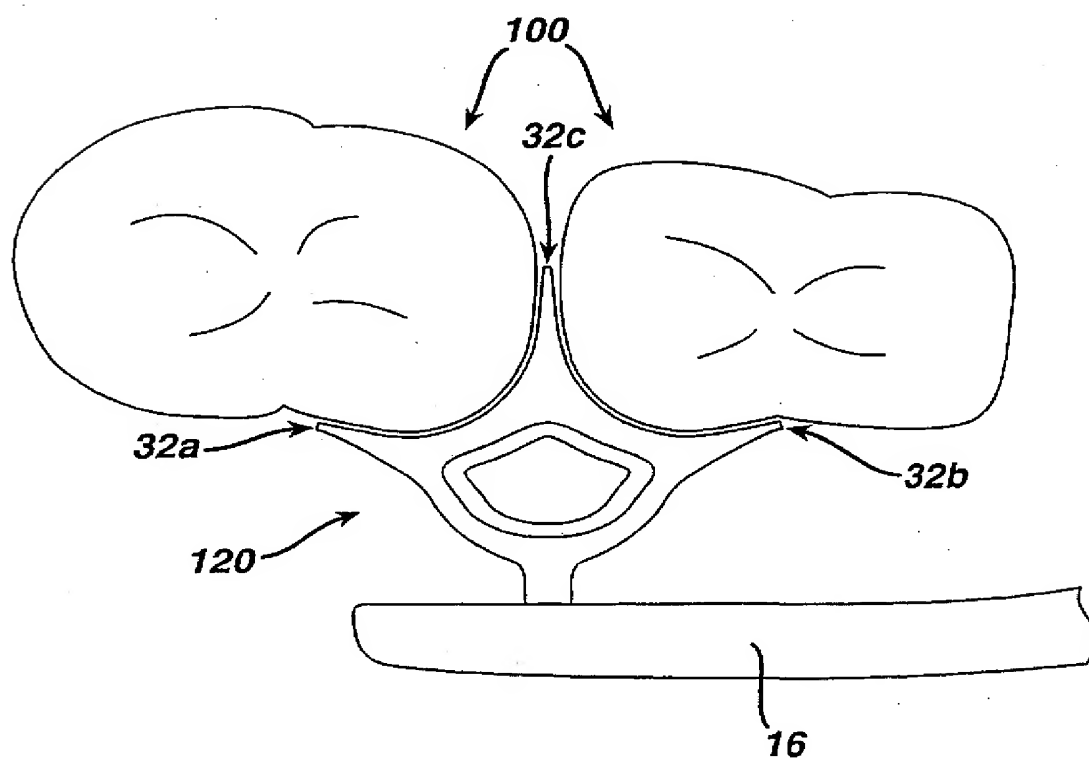
FIG. 3A



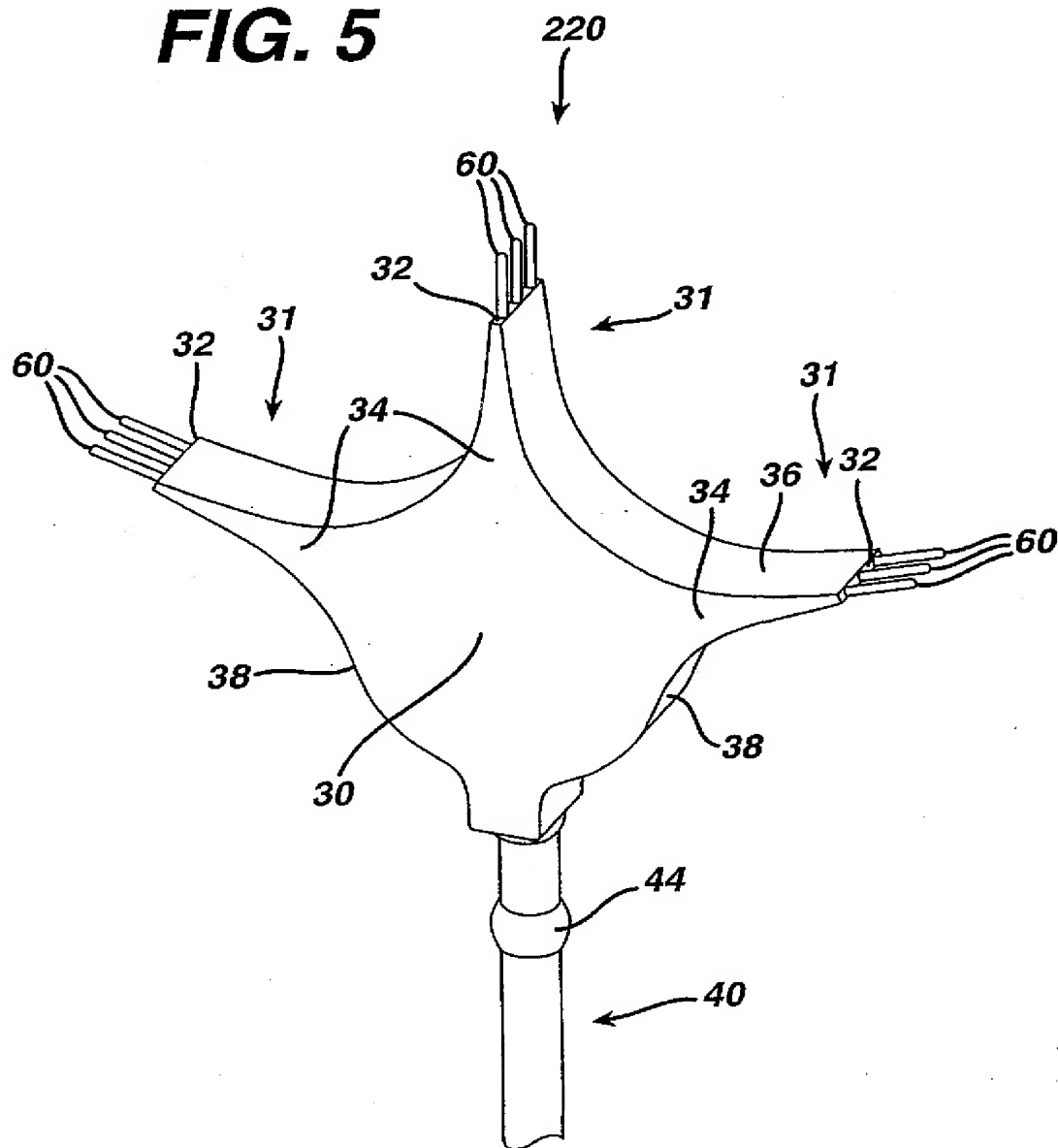
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FIG. 4

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FIG. 4A

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FIG. 5

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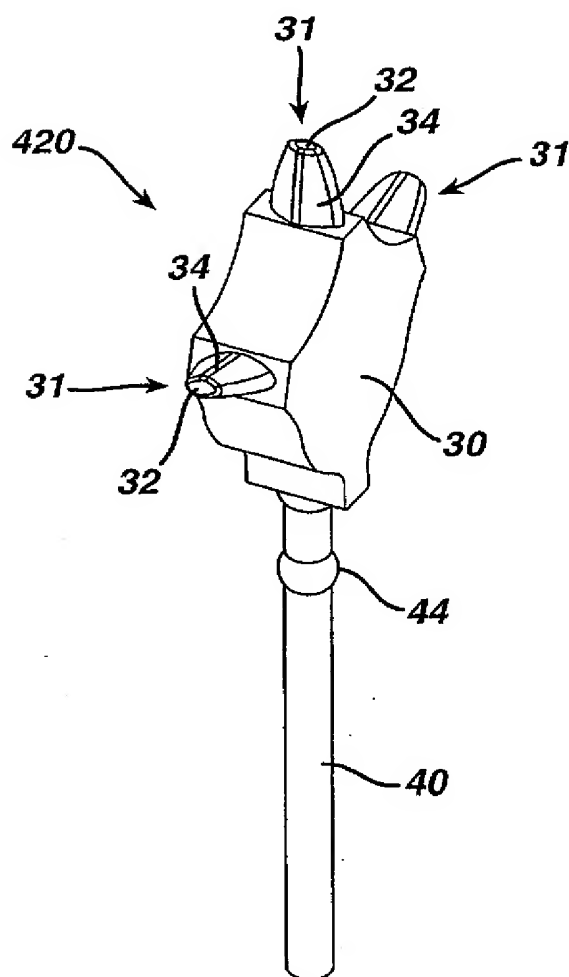
FIG. 5A

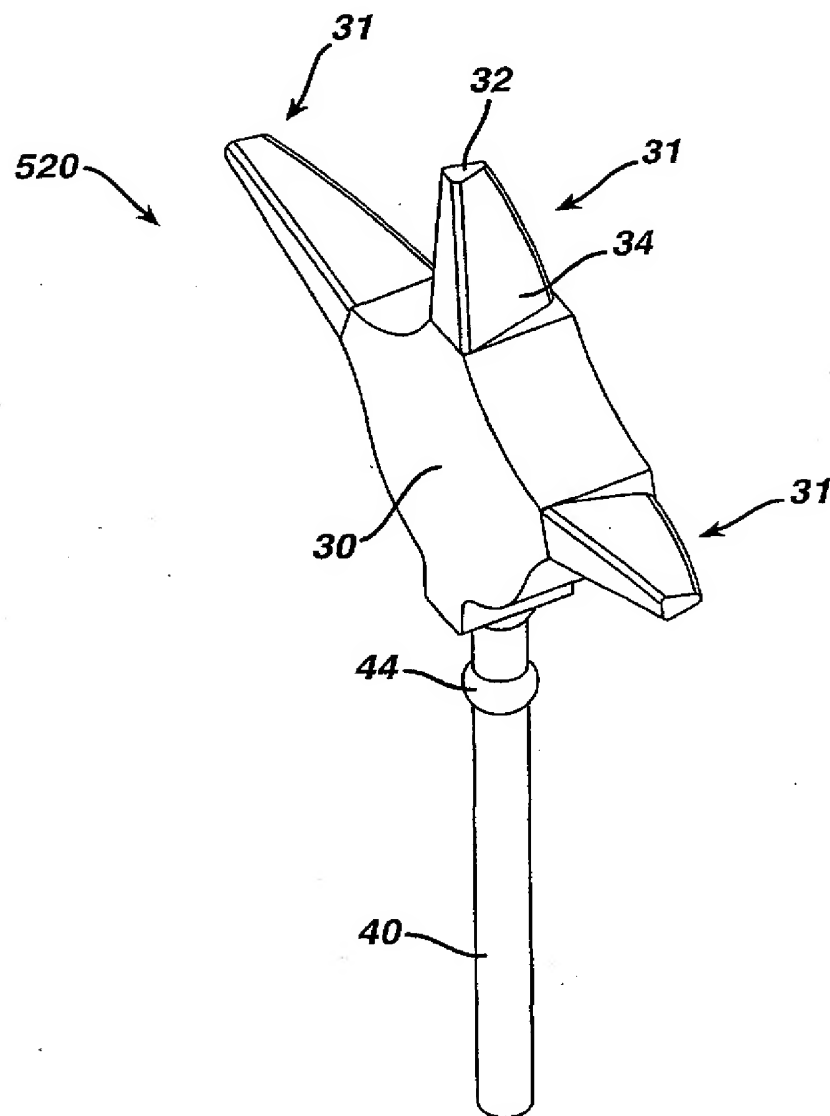
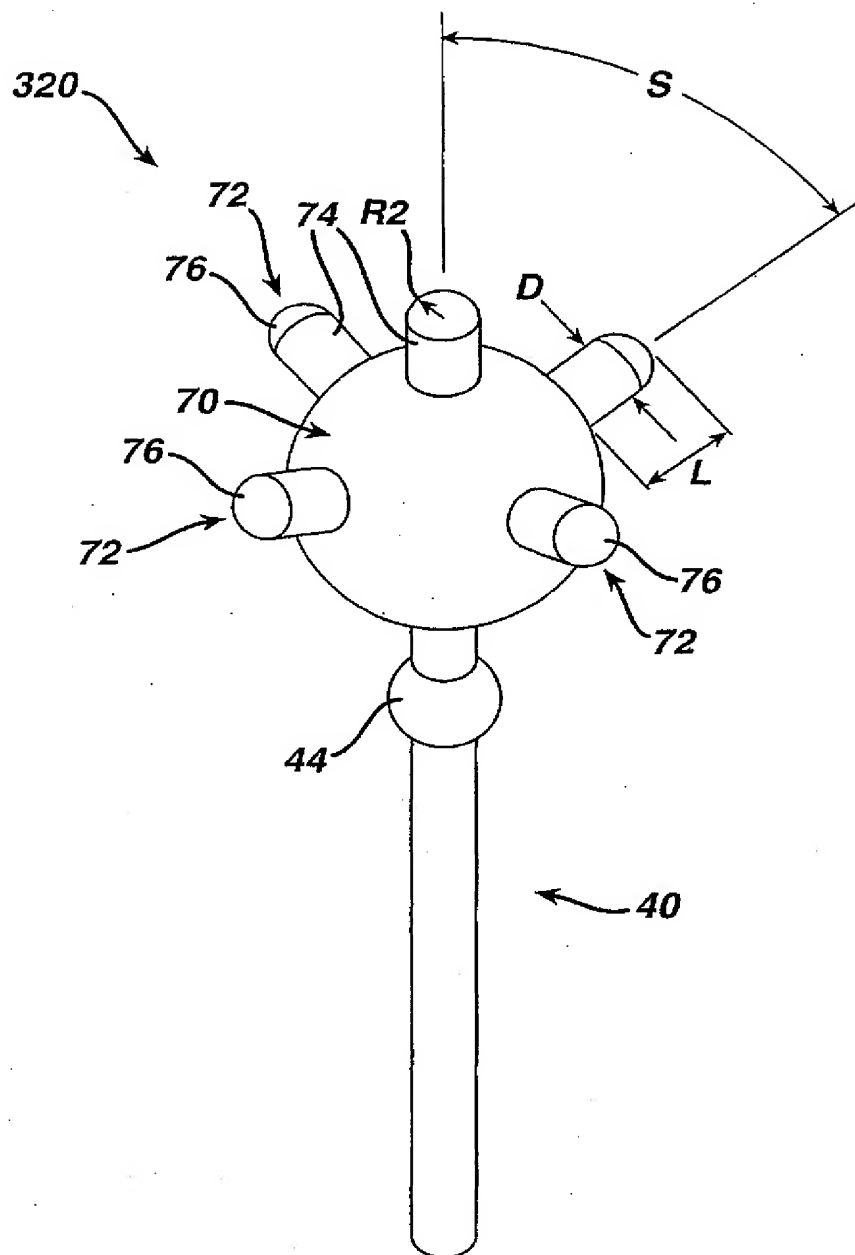
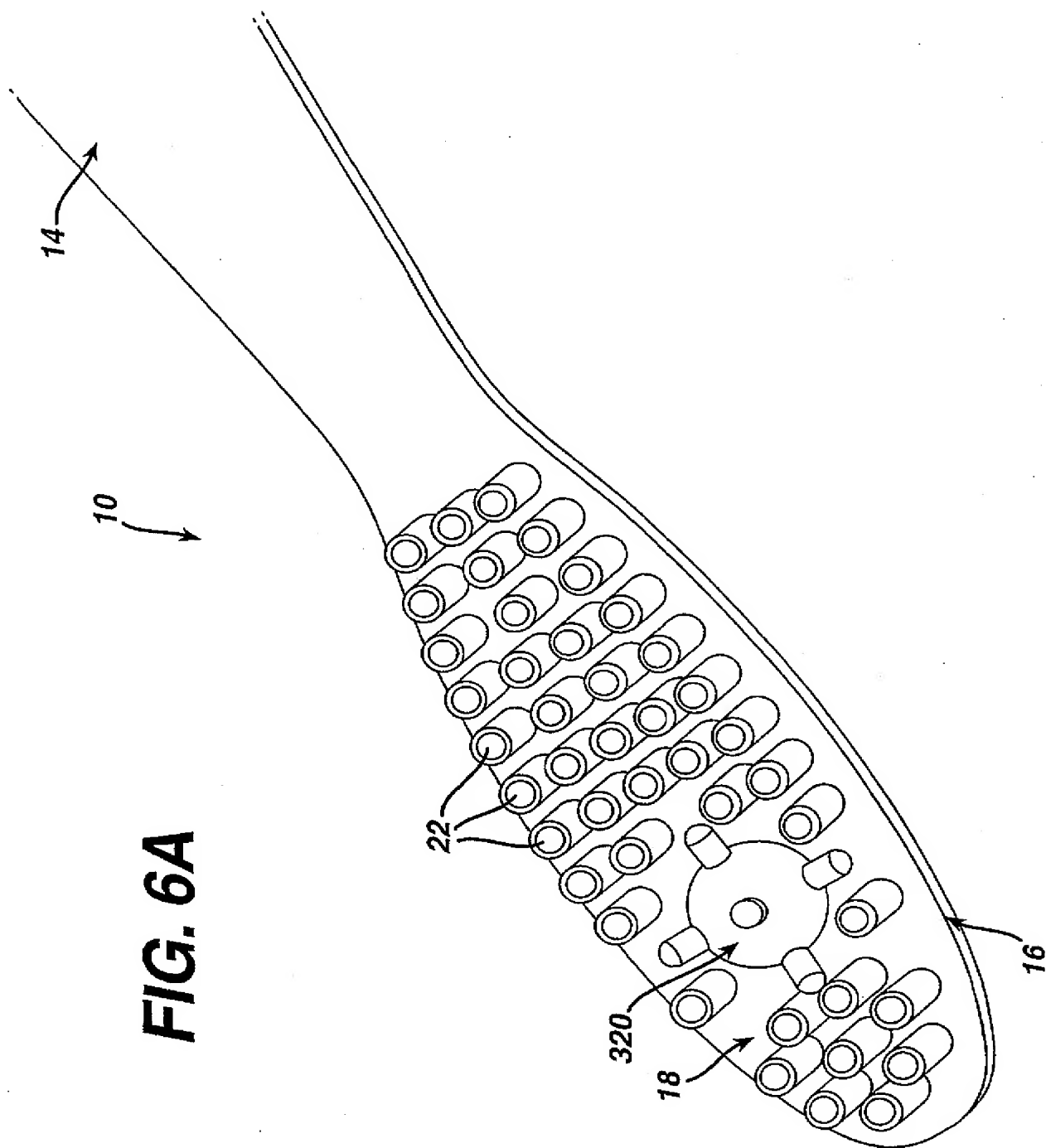
FIG. 5B

FIG. 6



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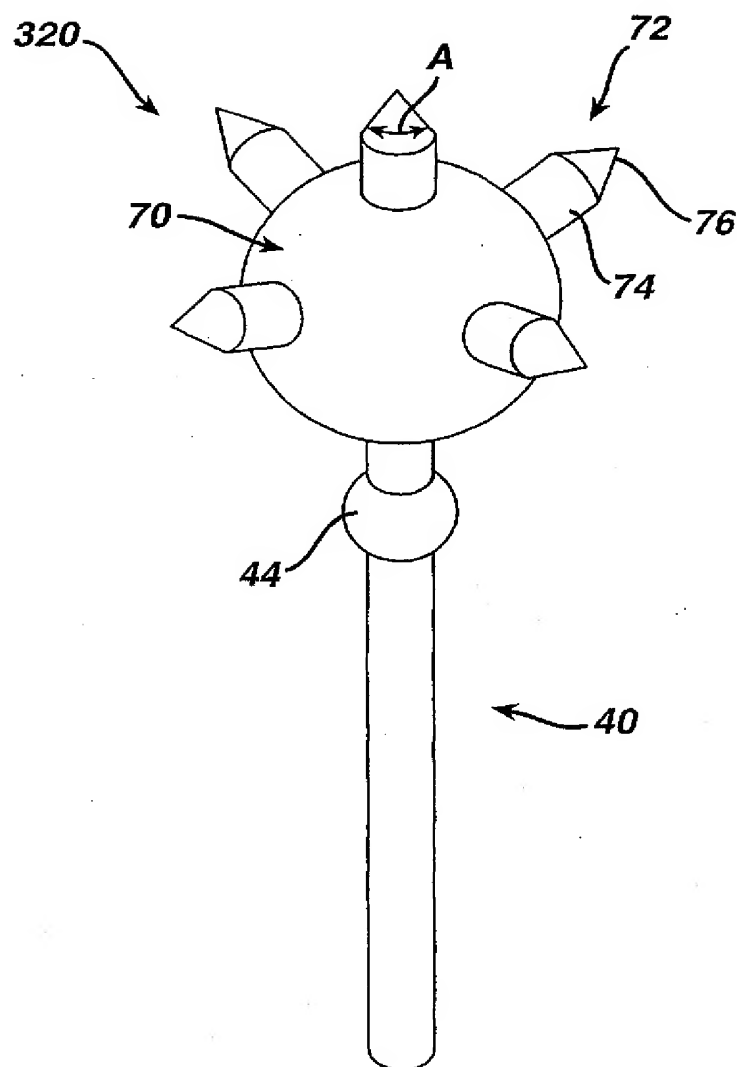
FIG. 6B

FIG. 7

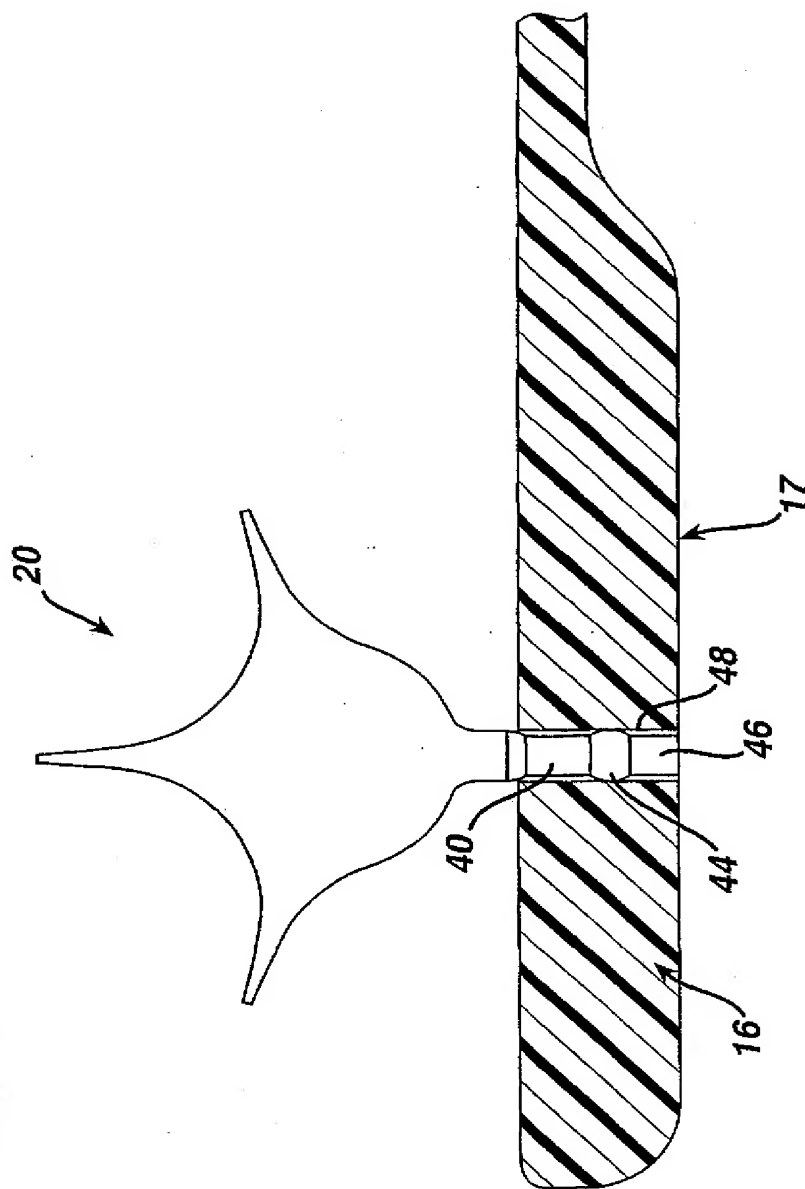
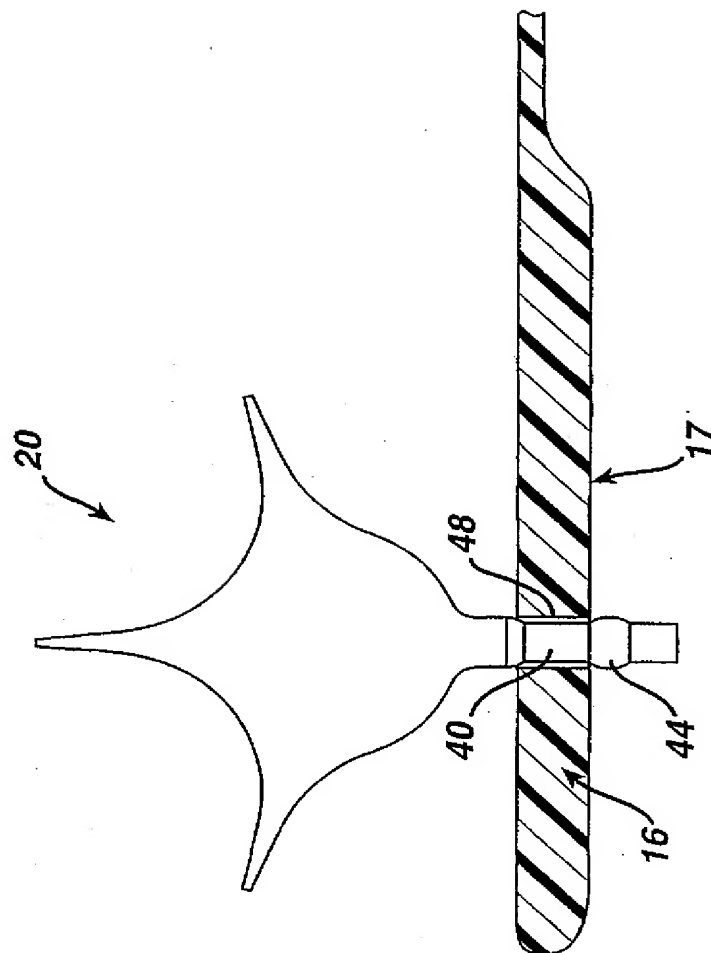


FIG. 7A

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(71) Applicant (for all designated States except US):
GILLETTE CANADA COMPANY [CA/CA]; 4 Robert
Speck Parkway, Mississauga, Ontario L4Z 4C5 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BRAUN, Phillip,**

M. [US/US]; 128 Beechwood Hill Trail, Exeter, RI 02822 (US). **BREDALL, William, A.** [US/US]; 257 Marvilla Circle, Pacifica, CA 94044 (US). **ROBERTS, Michael** [IE/US]; 12 Apache Drive, Brookfield, CT 06804 (US). **MASTERMAN, Thomas, Craig** [US/US]; 264 Henry Street, San Francisco, CA 94114 (US).

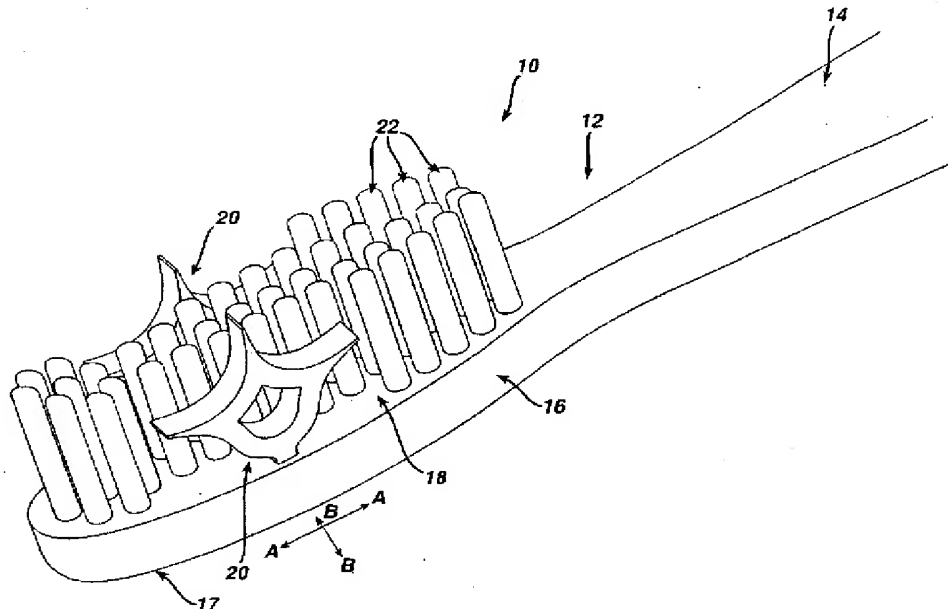
(74) Agents: **GALLOWAY, Peter, D.** et al.; Ladas & Parry, 26 West 61st Street, New York, NY 10023 (US).

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[Continued on next page]

(54) Title: ORAL CARE DEVICES



(57) Abstract: Oral devices are provided, including oral brushes that include bristle tufts and a rocking member having radially extending protrusions constructed to penetrate between a user's teeth. The protrusions are shaped to penetrate the interproximal region, cleaning between a user's teeth and stimulating the gums.

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INTERNATIONAL SEARCH REPORT

Int lonal Application No

PCT/US 01/24561

A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A46B A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | --- | 7-21 |
| A | US 3 230 562 A (BIRCH MARJORIE A) 25 January 1966 (1966-01-25) figures 1-4, 8, 9 | 1-3, 6, 22-39 |
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| A | --- | |
| A | US 2 246 867 A (NASH MANLEY K ET AL) 24 June 1941 (1941-06-24) left-hand column, line 13-27; figures --- -/- | |

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

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INTERNATIONAL SEARCH REPORT

Int. Patent Application No.

PCT/US 01/24561

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
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unabhängig voneinander für den späteren Gebrauch vorbereitet werden, so dass ein gegenseitiges Beschädigen oder Verschmutzen verhindert wird.

Das Anbringen von sowohl konventionellen Borsten als auch
5 der weichelastischen Struktur am Trägerelement hat den
Vorteil, dass eine beliebige räumliche Anordnung der
beiden Komponenten möglich ist. Ein solches vorbereitetes
Trägerelement kann zur Endfertigung mit verschiedenen
Zahnbürstengrundkörpern verbunden werden, so dass mit
10 wenigen Grundkörpern eine grosse Anzahl verschiedener
Zahnbürsten realisierbar ist.

Die konventionellen Borsten können in beiden Fällen vor
oder nach dem Anbringen der weichelastischen Struktur für
den Gebrauch vorbereitet werden. Sind beide Komponenten am
15 Trägerelement vorgesehen, wird bevorzugt zuerst die weich-
elastische Struktur, einschliesslich etwaiger
Reinigungselemente, angeformt und das Trägerelement
anschliessend mit Borsten besetzt, welche beispielsweise
durch Aussparungen in der weichen oder harten Komponente
20 hindurchgeführt sein können.

Die Herstellung des Zusatzteils, d.h. des Trägerelements
mit einem oder mehreren weichelastischen Reinigungsele-
menten, erfolgt bevorzugt im Zwei- oder Mehrkomponenten-
spritzgiessverfahren. Dabei wird vorzugsweise eine
25 unlösbare Verbindung zwischen den Komponenten hergestellt.

Die weichelastische Struktur ist bevorzugt auch seitlich
am Trägerelement angeordnet, z.B. angespritzt, wobei sie
im montierten Zustand seitlich mit der Aussenkontur des
Kopfteils abschliesst oder über diese hinausgeht. Sie
30 dient z.B. zum Abdichten ungeschweisster Stellen, zum
Massieren des Gaumens, z.B. durch angespitzte leicht

abstehende elastische Elemente, oder als Aufprallschutz beim Putzen.

Vorzugsweise besteht das weichelastische Reinigungselement aus einem insbesondere thermoplastischen Elastomer, z.B. aus natürlichem oder synthetischem Gummi. Für das Trägerelement wird bevorzugt das für den Zahnbürsten-
5 grundkörper eingesetzte Material verwendet, insbesondere Polypropylen, Styrol-Acryl-Nitril, Polyester, Acryl-Nitril-Butadienstyrol (ABS) oder Isoplast®. Die Shore A
10 Härte der weichen Komponente ist vorzugsweise geringer als 90 und liegt besonders bevorzugt unter 50.

Besonders bevorzugt wird das Trägerelement gemäss der AFT (Anker Free Tufting) Technologie mit Borsten besetzt. Dabei wird zunächst die Trägerplatte aus einem Hart-
15 material mit der weichelastischen Struktur hergestellt, insbesondere im Zweikomponenten-Spritzgussverfahren. Anschliessend werden die Borstenfilamente durch Aussparungen in der Trägerplatte und/oder in der
20 weichelastischen Struktur hindurchgeführt und zur Befestigung an der Trägerplatte bzw. der weichelastischen Struktur mit ihren im Anwendungsfall dem Bürstenkopf zugewandten rückwärtigen Enden verschweisst oder verklebt.
Dies hat den Vorteil, dass sich weitgehend beliebige Borstenanordnungen, insbesondere auch flächige
25 Borstengebilde, realisieren lassen. Das Trägerelement wird insbesondere mittels Ultraschallschweissen mit dem Kopfteil verbunden, z.B. wie in der DE 200 06 311 U beschrieben.

Da sich gummielastisches Material, insbesondere ein
30 thermoplastisches Elastomer, aufgrund der starken Dämpfung der Ultraschallschwingungen nur bedingt Ultraschall

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verschweissen lässt, wird die Schweissfläche zwischen Trägerelement und Kopfteil bevorzugt zumindest teilweise von der weichelastischen Komponente freigehalten. Vorzugsweise wird dazu der Anspritzpunkt der Weichkomponente an der borstentragenden Seite des Trägerelements gewählt, damit keine Materialbrücken aus der Weichkomponente die Schweissfläche verkleinern. Für den Fall, dass dennoch im Bereich der Schweissfläche weichelastische Elemente angeordnet werden sollen, wird deren Lage vorzugsweise seitlich von der Längsachse der Zahnbürste gewählt. Damit entstehen unverschweisste Stellen ebenfalls seitlich am Trägerelement, während der in Längsrichtung vordere und hintere Bereich zwischen Trägerelement und Kopfteil verschweisst werden kann. Somit ist ein guter Halt des Trägerelements gewährleistet, da durch die Putzbewegung und die entsprechenden Hebelkräfte vor allem der vordere bzw. hintere Bereich und weniger die Seitenbereiche belastet werden. Eine nur punktuelle Verschweissung mit ungeschweissten Stellen kann auch gezielt eingesetzt werden, damit Bürstenkopf und Trägerelement gegeneinander beweglich sind und so eine gewisse Flexibilität des gesamten Bürstenkopfes erreicht wird .

Die weichelastische Struktur kann nach Art einer Dichtlippe auch zum zusätzlichen Abdichten ungeschweisster Stellen dienen. Dadurch wird vorteilhaft der Raum zwischen dem Trägerelement und dem Kopfteil gegen das Eindringen von Wasser abgedichtet. Somit können sich in diesem Bereich keine Keime ansammeln, und die Bürste ist hygienischer. Um eine angemessene Dichtfunktion zu erreichen, ist die Shore A Härte der Weichkomponente vorzugsweise geringer als 50.

Beispiele für die Erfindung sind in den Zeichnungen dargestellt und nachfolgend beschrieben. Es zeigen rein schematisch:

5 Fig. 1a-d Ansichten einer erfindungsgemässen Zahnbürste in verschiedenen Montagestadien, wobei das Zusatzteil durch Nieten am Kopfteil befestigt wird;

10 Fig. 2a-e Ansichten einer weiteren Zahnbürste, deren Zusatzteil durch Nieten befestigt wird;

Fig. 3a-e Ansichten einer Zahnbürste, deren Zusatzteil durch Schweissen befestigt wird;

Fig. 4a-e Ansichten einer Zahnbürste, deren Zusatzteil mittels einer Schnappverbindung befestigt wird;

15 Fig. 5a-e Ansichten einer weiteren Zahnbürste, deren Zusatzteil durch eine Schnappverbindung befestigt wird;

Fig. 6a-f Ansichten einer Zahnbürste, bei der das Zusatzteil in klemmender Weise befestigt wird;

20 Fig. 7a-e die Herstellung einer Zahnbürste im AFT Verfahren;

Fig. 8a-e Ansichten einer weiteren Zahnbürste, deren Zusatzteil durch eine Schnappverbindung befestigt wird;

25 Fig. 9a-f Ansichten einer weiteren Zahnbürste, deren Zusatzteil mit Spiel am Kopfteil befestigt ist;

Fig. 10a-j die Herstellung einer weiteren Zahnbürste im AFT Verfahren;

Fig. 11a-c Ansichten einer Zahnbürste mit einer seitlichen Umrandung aus weichelastischem Material.

5 Alle dargestellten Zahnbürsten haben einen Grundkörper mit einem Kopfteil 1 und einem Griffteil 2, der nur teilweise dargestellt ist. Ein Zusatzteil 4 mit mehreren weichelastischen Reinigungselementen 6 unterschiedlicher Form, die mit einem Trägerelement ebenfalls unterschiedlicher
10 Form verbunden sind, ist bei der fertigen Zahnbürste mit dem Kopfteil 1 verbunden. Das Kopfteil 1 ist des weiteren direkt (Fig. 1 - 5) bzw. indirekt (Fig. 6) mit Bündeln 3 aus konventionellen Borstenfilamenten versehen. Material und Anordnung der Borstenbündel 3 kann unterschiedlich
15 sein. Im Folgenden wird nur auf die Besonderheiten der einzelnen Ausführungsbeispiele eingegangen. Dabei sind einander entsprechende Elemente mit gleichen Bezugszeichen bezeichnet.

Fig. 1a,c zeigt eine Zahnbürste, deren Kopfteil 1 bereits
20 mit Borstenbündeln 3 versehen wurde. Das in Fig. 1b dargestellte Zusatzteil 4 hat ein im Schnitt U-förmiges Trägerelement 5 aus einem Hartmaterial, insbesondere demselben Kunststoff, der zur Herstellung des Kopfteils 1 bzw. des gesamten Grundkörpers verwendet wurde. Mit dem
25 Trägerelement 5 sind weichelastische Reinigungselemente 6, hier in Form von geraden Stäben, fest verbunden. Die Reinigungselemente 6 sind leicht aus der Vertikalen aufeinander zu geneigt und schliessen mit der Vertikalen einen Winkel von 5 bis 30° ein. Auf diese Weise berühren
30 die elastischen Reinigungselemente 6 die konventionellen Borstenbündel 3 (Fig. 1d) und können diese sogar kreuzen

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(nicht dargestellt). Eine derartige Stellung ist mit konventionellen Herstellungsverfahren nur mit aufwendigen Verdrängungstechniken realisierbar.

Das Trägerelement 5 ist in seiner Form an eine in Fig. 1c sichtbare Aussparung 9 im den Borstenbündeln 3 abgewandten Bereich des Kopfteils 1 angepasst. In diesem Bereich befinden sich des weiteren Stifte 7, die durch ein Loch 8 im Trägerelement 5 hindurchgesteckt werden können. Die Stifte 7 werden kalt oder warm verformt und so im Loch 8 dauerhaft fixiert. Eine Aufsicht auf die fertiggestellte Zahnbürste zeigt Fig. 1d.

Der untere Bereich des Lochs 8 oder des gesamten Kopfteils 1 kann aus ästhetischen oder hygienischen Gründen durch eine Schutzschicht 22 aus weichem Kunststoff abgedeckt werden (vgl. Fig. 2d). Ebenso werden die Grenzbereiche zwischen dem Trägerelement 5 und dem Kopfteil 1 vorzugsweise durch weichen Kunststoff abgedeckt. Als Material hierfür wird beispielsweise das Weichmaterial verwendet, das auch für den Griffbereich der Zahnbürste verwendet wird. Vorzugsweise wird die Schutzschicht bereits während der Herstellung des Griffteils im Mehrkomponentenspritzgiessverfahren angespritzt. Die Kunststoffschicht kann jedoch auch direkt an das Trägerelement angeformt sein.

Ein weiteres Beispiel für eine Zahnbürste, deren Zusatzteil 4 durch eine Nietverbindung mit dem Kopfteil 1 verbunden wird, ist in Fig. 2a-e dargestellt. Das Zusatzteil besteht hier aus einem tellerförmigen Trägerelement 5, mit dem flächige weichelastische Reinigungselemente 6 rosettenförmig verbunden sind. Das Trägerelement 5 weist einen Stift 7' auf, mit dem das Zusatzteil 4 durch ein

entsprechend vorbereitetes Loch 8' im vorderen Ende des Kopfteils durchgesteckt und durch Verformen des Stiftes 7' fixiert werden kann. Die weichelastischen Reinigungselemente 6 befinden sich im Bereich der Spitze des Kopfteils 1. In Richtung des Griffteils 2 schliesst sich das Borstenfeld mit einzelnen Borstenbündeln 3 an. Eine Schutzschicht 22 deckt den Bereich des Lochs 8' ab.

Fig. 3a-e zeigt ein weiteres Beispiel für eine Zahnbürste, die im Ergebnis einer Zahnbürste gemäss Fig. 2 ähnelt. Das Zusatzteil 4 mit einem tellerförmigen Trägerelement 5 und rosettenartigen weichelastischen Reinigungselementen 6 wird vorliegend mittels einer Schweissverbindung mit dem Kopfteil 1 verbunden. Dazu weist der vordere Bereich des Kopfteils eine tellerartige Aussparung auf, in die das Trägerelement 5 dank einer entsprechend strukturierten Unterseite 5a mittels Ultraschallschweissen dauerhaft eingefügt wird. Eine Seitenansicht der fertigen Zahnbürste zeigt Fig. 3d, die Aufsicht auf das kombinierte Borstenfeld aus konventionellen Borstenbündeln 3 und weichelastischen Reinigungselementen 6 zeigt Fig. 3e.

Das Zusatzteil 4 der in Fig. 4a-e dargestellten Zahnbürste ist mittels einer Schnappverbindung in der Mitte des Kopfteils 1 befestigt. Das Zusatzteil 4 umfasst ein rechteckiges Trägerelement 5, an dessen Ecken flügelartige weichelastische Reinigungselemente 6 angeordnet sind. Auf dem Trägerelement 5 befinden sich des weiteren zwei stabförmige Reinigungselemente 6 (Fig. 4b,c). Wie in Fig. 4a dargestellt, weist das Kopfteil 1 ein mittiges Loch 8'' auf, das zum Durchstecken eines federnd gestalteten Fortsatzes 11 am Trägerelement 5 dient. Zusatzteil 4 und Kopfteil 1 werden durch eine Schnappverbindung miteinander verbunden, die aufgrund des am unteren Ende 11a des

Fortsatzes 11 vergrösserten Querschnitts nicht ohne weiteres lösbar ist. Das Borstenfeld der konventionellen Borstenbündel 3 ist derart konfiguriert, dass die flügelartigen Reinigungselemente 6 zwischen den konventionellen Borstenbündeln 3 Platz finden, wie in Fig. 4a und 4e dargestellt. Das Zusatzteil 4 wird separat gefertigt und anschliessend in das Kopfteil 1 mit dem vorbereiteten Borstenfeld eingesetzt. Dadurch können auch durch das konventionelle Borstenfeld durchgreifende Strukturen der weichelastischen Reinigungselemente 6 realisiert werden, wie die über Eck angeordneten flügelartigen Elemente aus Fig. 4b-e oder die in verschiedene Raumrichtungen weisenden, aufgefächerten stiftförmigen Reinigungselemente aus Fig. 8. Die Unterseite des Kopfteils 1 ist aus hygienischen oder ästhetischen Gründen durch eine Schicht 22 aus weichelastischem Material abgedeckt.

Fig. 5a-e zeigen ein weiteres Beispiel für eine Schnappverbindung zwischen dem Zusatzteil 4 und dem Kopfteil 1 einer erfindungsgemässen Zahnbürste. Das Kopfteil 1 weist innerhalb des Borstenfelds aus konventionellen Borstenbündeln 3 einen vorbereiteten Bereich 13 für die Aufnahme des Zusatzteils 4. Dieser Bereich 13 besteht aus einer Vertiefung, an deren Rand senkrecht zur Ausrichtung des Handgriffs 2 jeweils eine Nut 12 verläuft, die dem Kopfteil 1 wie auch die an seinem seitlichen Rand verlaufenden Nuten 12' eine gewisse Elastizität bzw. federnde Wirkung gibt. Der vorbereitete Bereich 13 ist geringfügig kleiner als die Grundfläche des Trägerelements 5, so dass dieses passend und in klemmender Weise in den Bereich 13 eingesetzt werden kann. Wie aus der Aufsicht in Fig. 5e erkennbar, hat das Zusatzteil sowohl stabförmige als auch flächige, quer zur Ausrichtung des Handgriffs 2 angeordnete Reinigungselemente.

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Fig. 6a-f zeigt ein weiteres Beispiel für eine erfindungsgemäße Zahnbürste, hier eine Aufsteckzahnbürste für ein elektrisches Zahnreinigungsgerät. Die konventionellen Borstenbündel 3 sind an einer separaten Borstenplatte 18 befestigt, die im montierten Zustand mit dem 5 daran angepassten Kopfteil 1 der Zahnbürste bzw. einer darauf dreh- oder schwenkbar befestigten Scheibe 23 verbunden ist. Die weichelastischen Reinigungselemente 6, hier stabförmig, sind an einem in der Aufsicht leicht gebogenen Trägerelement 5 befestigt, das einen flächigen 10 Fortsatz 16 aufweist, der im wesentlichen senkrecht zur Ausrichtung der Reinigungselemente 6 orientiert ist. Mit diesem Fortsatz 16 lässt sich das Zusatzteil 4 in eine entsprechend geformte Nut 14 in der Scheibe 23 1 einführen. In der Mitte des Kopfteils 1 und der Nut 14 ist eine runde Aussparung 15 angeordnet, in die ein entsprechendes Gegenelement 17 am Fortsatz 16 des Zusatzteils 4 eingreift. Damit werden Zusatzteil 4 und Kopfteil 1 15 passend und in klemmender Weise miteinander verbunden. Die Borstenplatte 18 hat an ihrem unteren Ende eine Nut 19 mit der die Borstenplatte 18 an der Scheibe 23 bzw. deren seitlichen Fortsätzen 23 befestigt werden kann. Das Zusatzteil 4 wird in der dargestellten Ausführungsform durch die Scheibe 23 mitbewegt. Als Alternative kann das 20 Zusatzteil 4 direkt am Kopfteil 1 befestigt werden und rotiert nicht mit.

Figur 7a-e zeigen ein Beispiel für die Herstellung einer Zahnbürste mittels der AFT Technologie. Die Figuren 7a-c zeigen Schnittansichten des Trägerelements 5 in verschiedenen 30 Verfahrensstadien, und zwar vor dem Bestücken mit weichelastischen Reinigungselementen 6 und konventionellen Borstenbündeln 3 (Fig. 7a), nach dem Aufbringen des weichelastischen Materials (Fig. 7b) und nach dem Aufbringen

- 14 -

der Borsten (Fig. 7c). Das Trägerelement 5 ist in seiner äusseren Form an die Abmessungen eines vorbereiteten Bereichs 13 in Form einer flachen Aussparung im Kopfteil 1 der Zahnbürste angepasst. Das Trägerelement 5 weist vorbereitete Bereiche 20 auf, in die die weichelastischen Reinigungselemente 6 angebracht, insbesondere angespritzt, werden. Des weiteren hat das Trägerelement 5 Aussparungen 24, die ganz oder teilweise mit weichelastischem Material 6' gefüllt werden, vgl. auch die Detailzeichnung Fig. 7e.

Des weiteren sind Löcher 21 im Trägerelement 5 vorhanden, durch die Borstenbündel 3 durchgesteckt und an der Rückseite durch Anschmelzen ihrer rückwärtigen Enden 3a befestigt werden. Die elastischen Materialbereiche 6' haben weitere Löcher 21', die ebenfalls zur Aufnahme von Borstenbündeln 3 dienen, welche auf die gleiche Art befestigt werden. Die Materialbereiche 6' können ein oder mehrere Borstenbündel 3 aufnehmen. Die im elastischen Material 6' verankerten Borstenbündel 3 sind daher besonders elastisch verankert bzw. aufgehängt. Weitere Borstenbündel 3 werden direkt auf dem Trägerelement 5 befestigt. Das mit Borstenbündeln und der weichelastischen Struktur 6, 6' bestückte Trägerelement 5 wird anschliessend in den vorbereiteten Bereich 13 eingesetzt.

Die im Anwendungsfall dem Boden der Ausnehmung 13 zugewandte Kante 30 des Trägerelements 5 ist spitz gestaltet, ebenso im Beispiel aus Fig. 10 und 11. Diese spitz zulaufende Kante 30 dient beim Ultraschallschweissen zum Verbinden mit dem Kopfteil 1 als Energiekonzentrator sowie Materialreservoir für zu verflüssigendes Material.

Die AFT Technologie kommt ohne Anker oder Klammern zum Befestigen der Borstenfilamente aus, die stattdessen direkt an der Trägerplatte angeschweisst werden. Damit

wird die Breite eines Borstenbündels nicht durch den Anker bestimmt, so dass sich auch feinere Strukturen, insbesondere auch flächige Borstenanordnungen, realisieren lassen.

- 5 Technisch ist es auch möglich, beim AFT-Verfahren die Borstenfilamente vor dem Anbringen an die Trägerplatte für den Gebrauch vorzubereiten. Realisiert wird derzeit jedoch die Variante, bei der die Borsten erst nach dem Anbringen an die Trägerplatte bearbeitet werden.
- 10 Fig. 8a-e zeigt eine Variante zur Zahnbürste aus Fig. 4. Das Borstenfeld aus konventionellen Borstenbündeln 3 entspricht Fig. 4. Das Zusatzteil 4 hat eine Mehrzahl von sternförmig auseinandergehenden stiftförmigen Reinigungselementen 6, die durch die konventionellen Borstenbündel 3
- 15 durchgreifen (Fig. 8d, e). Der Befestigungsmechanismus entspricht Figur 4. Eine Schicht 22 aus weichelastischem Material deckt die Unterseite des Kopf- und Griffteils 1,2 ab.

- Fig. 9a-f zeigen ein weiteres Beispiel für eine erfindungsgemässe Zahnbürste. Das Kopfteil 1 weist einen vorbereiteten Bereich 13 für das Trägerelement 5 des Zusatzteils 4 auf, die grösser als das Trägerelement 5 selbst ist. Der Bereich 13 ist beispielsweise ein vollständig durch das Kopfteil 1 durchgehendes Loch, vgl.
- 25 Schnittzeichnungen Fig. 9b,d,e. Der Bereich 13 hat zwei seitliche Nuten 13a, deren Form an die Form zweier seitlicher Fortsätze 5b des Trägerelements 5 angepasst ist. Dieses wird in das Kopfteil 1 eingesetzt und verastet dort. Aufgrund des Spiels des Trägerelements 5
- 30 innerhalb des Bereichs 13, das ein seitliches Verschieben und/oder eine Schwenkbewegung um die durch die Fortsätze

5b definierte Achse ermöglicht, ergibt sich eine besondere Elastizität bzw. federnde Wirkung des Zusatzteils 4. Die Rückseite des Kopfteils 1 kann wiederum mit einer Schicht aus Weichmaterial abgedeckt sein.

5 Fig. 10a-j zeigt ein weiteres Beispiel für eine mittels AFT hergestellte Zahnbürste. Die Figuren 10a-c entsprechen den Figuren 7a-c und zeigen jeweils die Trägerplatte 5 in verschiedenen Verfahrensstadien. Fig. 10d-f zeigen die
10 dieselbe Trägerplatte 5 im Schnitt entlang der in Fig. 10a angedeuteten Linie I-I. Das mittig angeordnete weichelastische Element 6 ist flächig bzw. segelartig und in der Aufsicht (Fig. 10h) wellenförmig. Wie in Fig. 10e+f dargestellt, umfasst die weichelastische Struktur seitlich angeformte Bereiche 6'', die im montierten Zustand (Fig.
15 10h) den Zahnbürstenkopf 1 seitlich begrenzen und mit der Aussenkontur des Kopfteils nahezu bündig abschliessen. Sie dienen beispielsweise als Aufprallschutz und/oder zur zusätzlichen Massage des Saumens. Die Bereiche 6'' weisen ebenfalls Löcher 21' auf zur Aufnahme von Borstenbündeln
20 3, die dadurch elastisch aufgehängt und beim Putzen besonders nachgiebig sind.

Das mit konventionellen Borsten 3 und der weichelastischen Struktur 6, 6', 6'' versehene Trägerelement 5 wird in eine Ausnehmung 13 im Bürstenkopf 1 eingesetzt. Der Bürstenkopf
25 1 ist in Fig. 10g+j ohne Trägerelement 5 sowie in Fig. 10h+i mit eingesetztem Trägerelement 5 in verschiedenen Ansichten dargestellt. In einem seitlichen Rand weist der Bürstenkopf 1 bzw. die Ausnehmung 13 seitliche Öffnungen
25 auf, die an die zuvor an das Trägerelement 5 angespritzten seitlichen weichelastischen Bereiche 6''
30 angepasst sind.

Das Trägerelement 5 wird mittels Ultraschallschweißen mit dem Bürstenkopf 1 verbunden. Die Schweissfläche 26 ist gestrichelt angedeutet. Um die Verschweißung zu realisieren, weist das Trägerelement an seinem unteren Rand einen Schweissrand 26' auf, der bei der Montage auf dem Grund der Aussparung 13 aufliegt, wobei die Berührungsfläche die Schweissfläche 26 definiert. Der Schweissrand 26' schmilzt unter Ultraschalleinfluss, so dass die beiden Teile 5 und 1 miteinander verbunden werden.

Da sich gummielastisches Material nur bedingt Ultraschall schweißen lässt, wird die Schweissfläche 26 möglichst frei davon gehalten, wie z.B. bei der Zahnbürste aus Fig. 7, oder nur minimal unterbrochen, wie bei der Zahnbürste aus Fig. 10. Ziel ist in beiden Fällen die vollständige Abdichtung des Hohlraums 28 zwischen Trägerelement 5 und Kopfteil 1, um Eindringen von Wasser und Keimen zu verhindern. Bevorzugt wird dazu der Anspritzpunkt des weichelastischen Materials an der borstentragenden Vorderseite des Trägerelements 5 gewählt, damit keine unnötigen Materialbrücken die Schweissfläche 26 verkleinern. Falls weitere weichelastische Elemente am Kopfteil 1, insbesondere an dessen Rückseite, vorhanden sind, wird deren Lage so gewählt, dass sie die Schweissfläche 26 nicht verkleinern. Beispielsweise liegen sie und der entsprechende Anspritzpunkt vollständig innerhalb des durch die Schweissfläche 26 definierten Bereichs an der Rückseite des Kopfteils 1 (nicht dargestellt). Bevorzugt wird die gesamte Berührungsfläche zwischen Kopfteil 1 und Trägerelement 5 zu mindestens 25% verschweisst, besonders bevorzugt entlang des Kopfumfanges (Linie 26).

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Im Beispiel aus Fig. 10 unterbrechen die weichelastischen Bereiche 6'' die Schweissfläche 26, so dass dort ungeschweissten Stellen 27 entstehen. Diese sind vorteilhaft an der Seite des Kopfteils 1 angeordnet, während die in Längsrichtung vorderen und hinteren Bereiche des Trägerelements 5 mit dem Kopfteil 1 fest verschweisst sind. Dadurch wird ein sicherer Halt des Trägerelements 5 gewährleistet, da durch die Putzbewegung und entsprechende Hebelkräfte der vordere und hintere Bereich der grössten Belastung ausgesetzt ist.

Die ungeschweissten Stellen 27 werden vorliegend durch die weichelastischen Bereiche 6'' nach Art einer Dichtlippe abgedichtet, so dass kein oder nur wenig Wasser in den Hohlraum 28 eindringen kann. Für eine gute Dichtfunktion wird vorzugsweise Material mit einer Shore A Härte von 50 oder weniger gewählt. Ungeschweisste Stellen zwischen Kopfteil und Trägerelement können auch gezielt eingesetzt werden, um eine gewisse Flexibilität zwischen den beiden Hartkomponenten zu erreichen.

Fig. 11 zeigt ein weiteres Beispiel für eine im AFT-Verfahren hergestellte Zahnbürste mit zwei segelartigen weichelastischen Reinigungselementen 6 in verschiedenen Ansichten. Das Trägerelement 5 ist an seiner Peripherie vollständig mit weichelastischem Material 6' umgeben, das im montierten Zustand (Aufsichtsdarstellung Fig 11a) das Kopfteil 1 an seinem äusseren Umfang an der Oberseite vollständig umschliesst und als Aufprallschutz dient. In Bereichen 6'' dient das Weichmaterial als Halterung für seitliche Borstenbündel 3, die durch das weichelastische Material 6'' hindurchgeführt sind.

Wie aus Fig. 11c hervorgeht, berühren sich die

- Hartkomponenten von Trägerelement 5 und Kopfteil 1 entlang einer Fläche 26 unterhalb der Weichkomponente im Bereich 6' und können hier mittels Ultraschall verschweisst werden. Die Schweissfläche 26 ist durch die seitlichen Bereiche 6'' unterbrochen, wobei jedoch, wie oben beschrieben, eine ausreichende Haltewirkung erzielt wird. Der Hohlraum 28 unterhalb des Trägerelements 5 wird durch die weichelastischen Bereiche 6'' und die entlang der Fläche 26 verschweissten Stellen abgedichtet.
- 10 Die oben mit Bezug auf Fig. 10 und 11 beschriebene Art der Verschweissung und Abdichtung der Komponenten kann mit Vorteil auch bei anderen Zahnbürsten eingesetzt werden.

Patentansprüche

1. Zahnbürste mit einem Handgriff (2) und einem Kopfteil (1) mit Borstenfilamenten (3) und einer weichelastischen Struktur (6, 6', 22), dadurch gekennzeichnet, dass die weichelastische Struktur (6, 6', 22) an einem aus einem Hartmaterial bestehenden Trägerelement (5) angeordnet ist, welches mit dem Kopfteil (1) verbunden ist.
2. Zahnbürste nach Anspruch 1, dadurch gekennzeichnet, dass die weichelastische Struktur wenigstens ein weichelastisches Reinigungselement umfasst.
3. Zahnbürste nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass das Trägerelement (5) aus demselben Material wie das Kopfteil (1) besteht.
4. Zahnbürste nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, dass zwischen dem Trägerelement (5) und dem Kopfteil (1) eine unlösbare Verbindung besteht, die vorzugsweise durch Verklemmen, Verschnappen, Nieten, Kleben, Schweißen, Ultraschallschweißen oder Wärmezufuhr hergestellt ist.
5. Zahnbürste nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, dass die weichelastische Struktur (6, 6', 22) und das Trägerelement (5) durch ein Zwei- oder Mehrkomponentenspritzgiessverfahren hergestellt sind, wobei vorzugsweise eine unlösbare Verbindung zwischen der weichelastischen Struktur (6, 6', 22) und dem Trägerelement (5) besteht.
6. Zahnbürste nach einem der vorangegangenen Ansprüche,

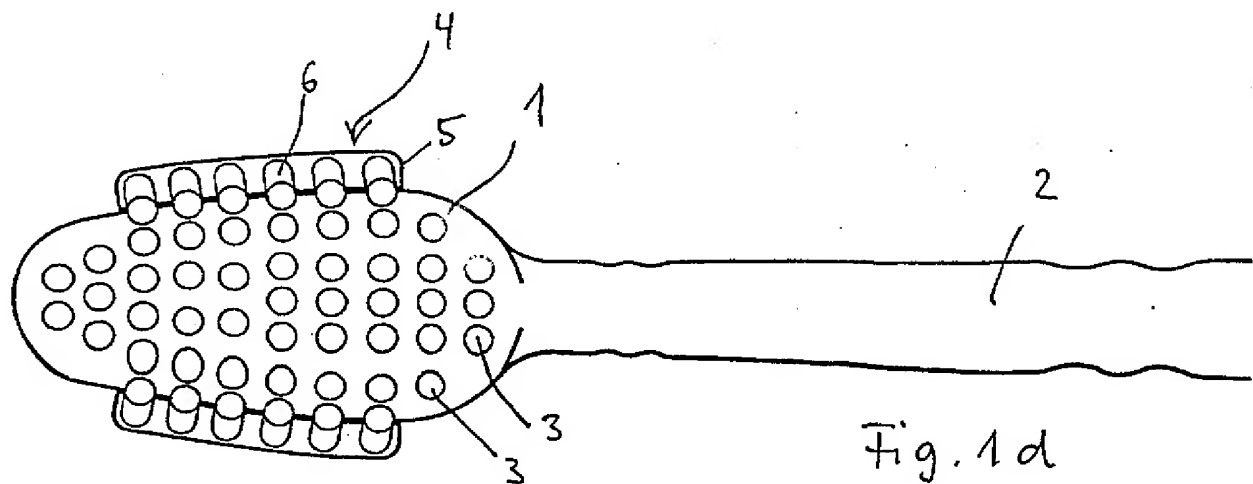
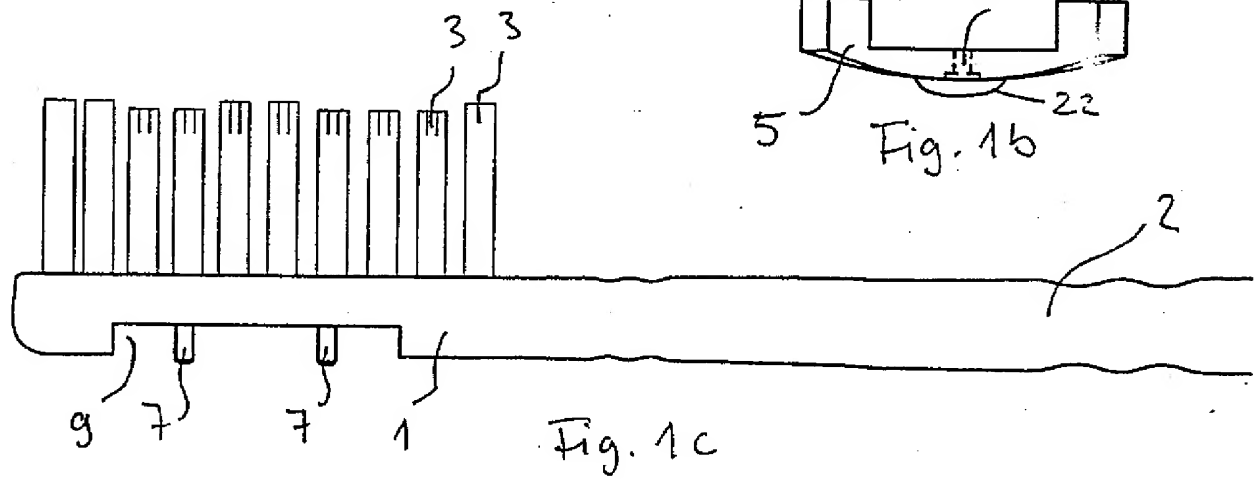
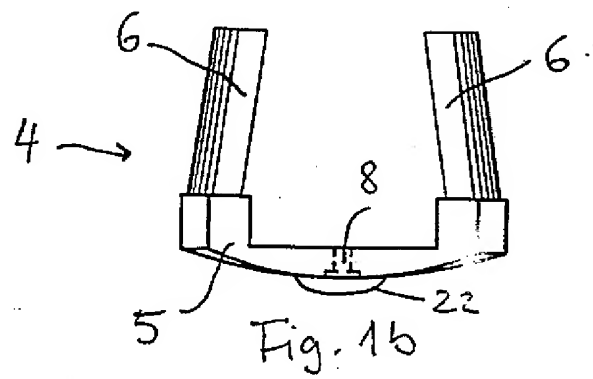
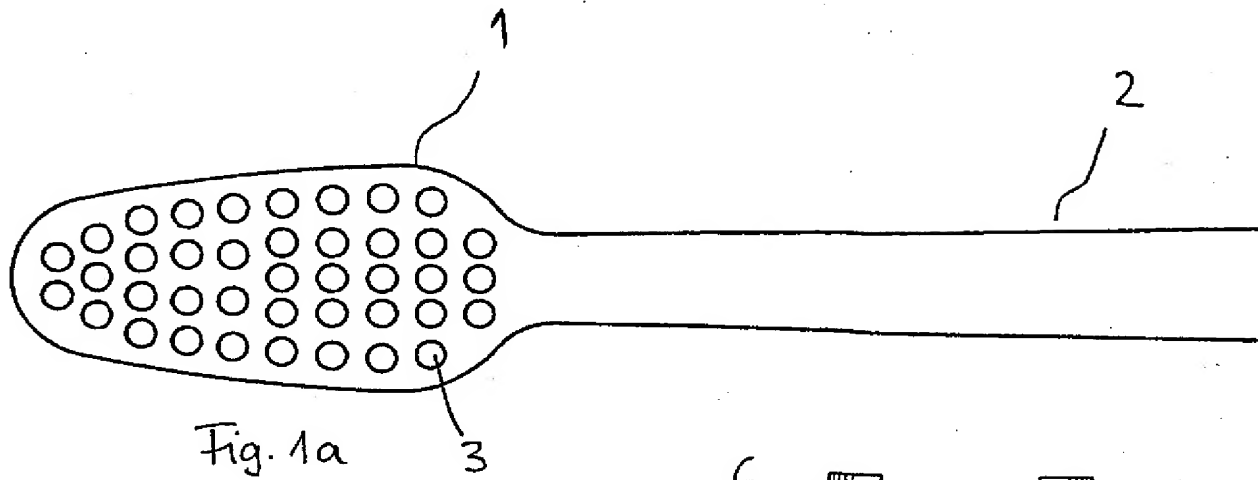
dadurch gekennzeichnet, dass das Material des Trägerelements (5) Polypropylen (PP), Styrol-Acryl-Nitril (SAN), Acryl-Nitril-Butadienstyrol (ABS), Isoplast® oder Polyester (PET) ist.

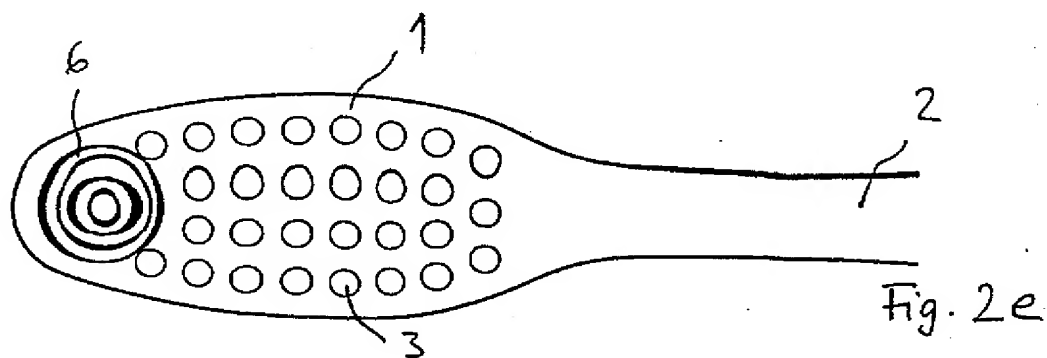
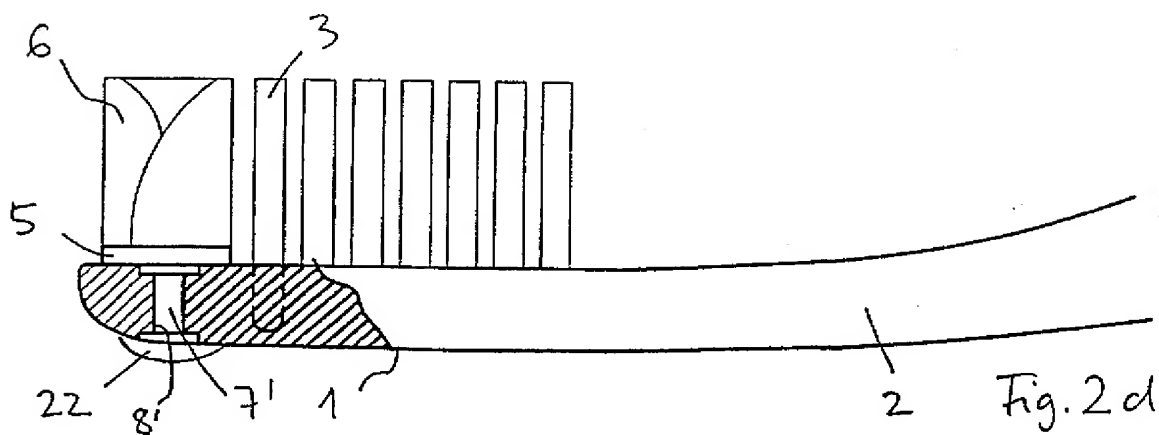
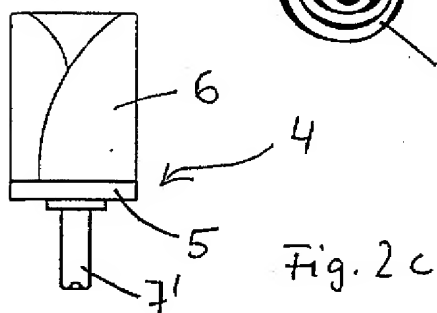
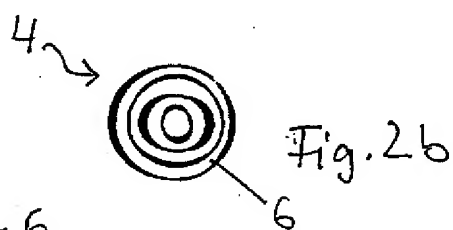
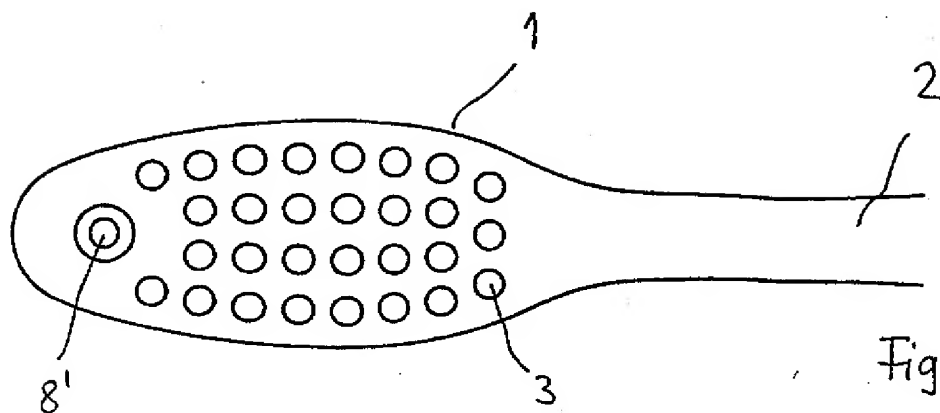
- 5 7. Zahnbürste nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, dass die Borstenfilamente (3) am Trägerelement (5) angeordnet sind.
8. Zahnbürste nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, dass die Borstenfilamente (3)
10 an der weichelastischen Struktur (6'') verankert sind.
9. Zahnbürste nach einem der Ansprüche 1-6, dadurch gekennzeichnet, dass die Borstenfilamente (3) mit einer Borstenplatte (18) oder direkt mit dem Kopfteil
15 (1) verbunden sind.
10. Zahnbürste nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, dass die Borstenfilamente (3) durch Aussparungen in der Trägerplatte (5) und/oder in der weichelastischen Struktur (6'') hindurchgeführt und zur Befestigung mit ihren im Anwendungsfall dem Kopfteil (1) zugewandten rückwärtigen Enden (3a) verschweisst oder verklebt sind.
- 20 11. Zahnbürste nach Anspruch 10, dadurch gekennzeichnet, dass die Trägerplatte (5) in eine Ausnehmung (13) im Kopfteil (1) eingesetzt und mit dem Kopfteil (1)
25 unlösbar verbunden ist.
12. Zahnbürste nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, dass die weichelastische Struktur (6, 6', 22) aus natürlichem oder synthe-

tischem Gummi, vorzugsweise aus einem thermoplastischen Elastomer, besteht, das bevorzugt eine Shore A Härte von weniger als 90, besonders bevorzugt von weniger als 50 hat..

- 5 13. Zahnbürste nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, dass Verbindungsstellen zwischen dem Kopfteil (1) und dem Trägerelement (5) durch weichelastisches Material (22) abgedeckt sind.
- 10 14. Zahnbürste nach einem der vorangegangenen Ansprüche, dadurch gekennzeichnet, dass der Kopfteil (1) eine Ausnehmung (13) aufweist, in welcher das Trägerelement (5) derart eingesetzt ist, dass es innerhalb der Ausnehmung (13) beweglich ist.
- 15 15. Verfahren zur Herstellung einer Zahnbürste nach einem der vorangegangenen Ansprüche, wobei wenigstens ein weichelastisches Reinigungselement (6) an einem aus einem Hartmaterial bestehenden Trägerelement (5) befestigt wird, das mit dem Kopfteil (1) der Zahnbürste verbunden wird.
- 20 16. Verfahren nach Anspruch 15, dadurch gekennzeichnet, dass das Trägerelement (5) und das Kopfteil (1) unlösbar miteinander verbunden werden, vorzugsweise durch Verklemmen, Verschnappen, Nieten, Kleben, Schweißen, Ultraschallschweißen oder Wärmezufuhr.
- 25 17. Verfahren nach Anspruch 15 oder 16, dadurch gekennzeichnet, dass die Borstenfilamente (3) am Kopfteil (1) oder einer Borstenplatte (18) befestigt werden und vor dem Befestigen des Trägerelements (5) geschnitten und/oder abgerundet und/oder auf andere
- 30 Weise gebrauchsfertig gemacht werden.

18. Verfahren nach einem der Ansprüche 15-17, dadurch gekennzeichnet, dass die weichelastische Struktur (6, 6', 22) und das Trägerelement (5) im Zweikomponentenspritzgiessverfahren hergestellt und anschliessend mit dem Kopfteil (1) verbunden werden, wobei vorzugsweise eine unlösbare Verbindung zwischen der weichelastischen Struktur (6, 6', 22) und dem Trägerelement (5) hergestellt wird.
19. Verfahren nach einem der Ansprüche 15-18, dadurch gekennzeichnet, dass das Trägerelement (5) mit der weichelastischen Struktur (6, 6', 22) versehen wird, das Kopfteil (1) vor Anbringen des Trägerelements (5) mit konventionellen Borstenbündeln (3) bestückt wird, die Borstenbündel (3) bearbeitet werden und anschliessend das Trägerelement (3) mit dem Kopfteil (1) verbunden wird.
20. Verfahren nach einem der Ansprüche 15-19, dadurch gekennzeichnet, dass die Borstenfilamente (3) durch Aussparungen in der Trägerplatte und/oder in der weichelastischen Struktur hindurchgeführt werden und zur Befestigung an der Trägerplatte bzw. der weichelastischen Struktur mit ihren im Anwendungsfall dem Bürstenkopf zugewandten rückwärtigen Enden verschweisst oder verklebt werden.
21. Verfahren nach Anspruch 20, dadurch gekennzeichnet, dass die Trägerplatte nach dem Beborsten und der Herstellung der weichelastischen Struktur in eine Ausnehmung im Bürstenkopf eingesetzt wird und mit dem Bürstenkopf durch Ultraschallschweissen unlösbar verbunden wird.





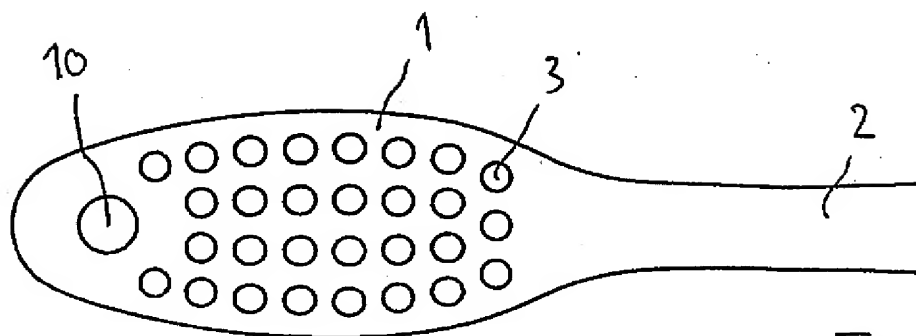


Fig. 3a

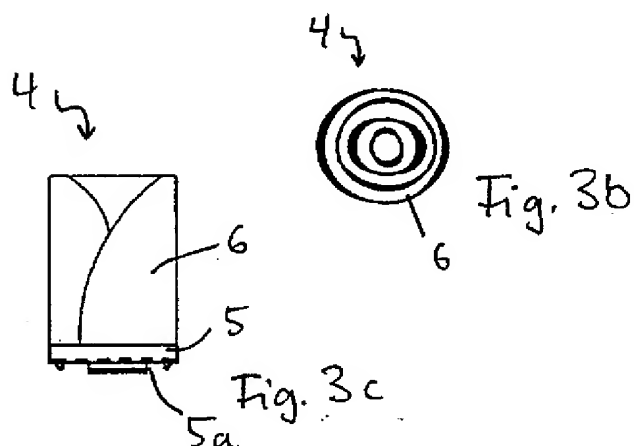


Fig. 3b

Fig. 3c

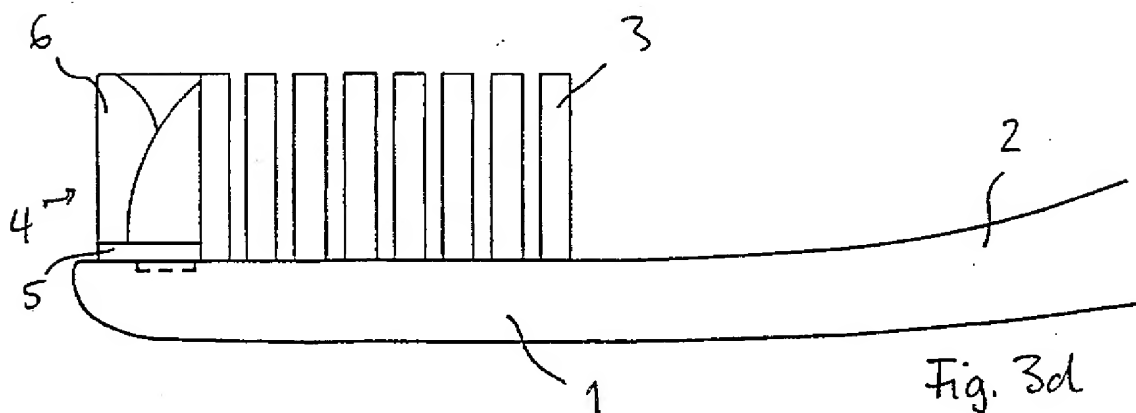


Fig. 3d

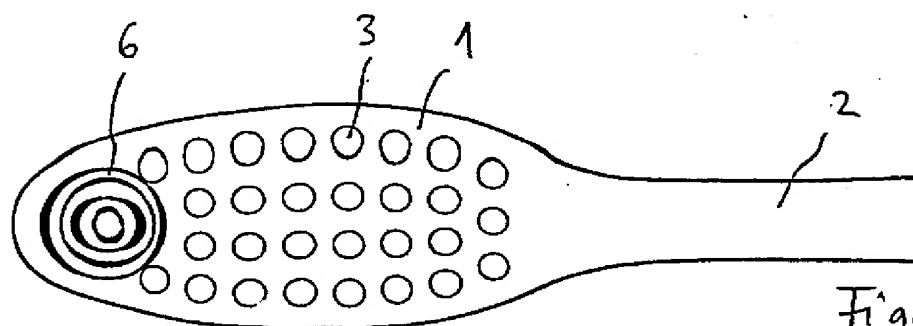
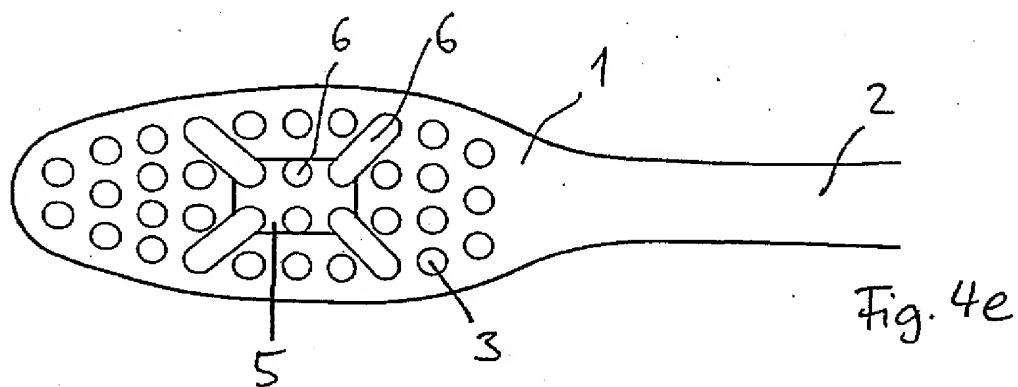
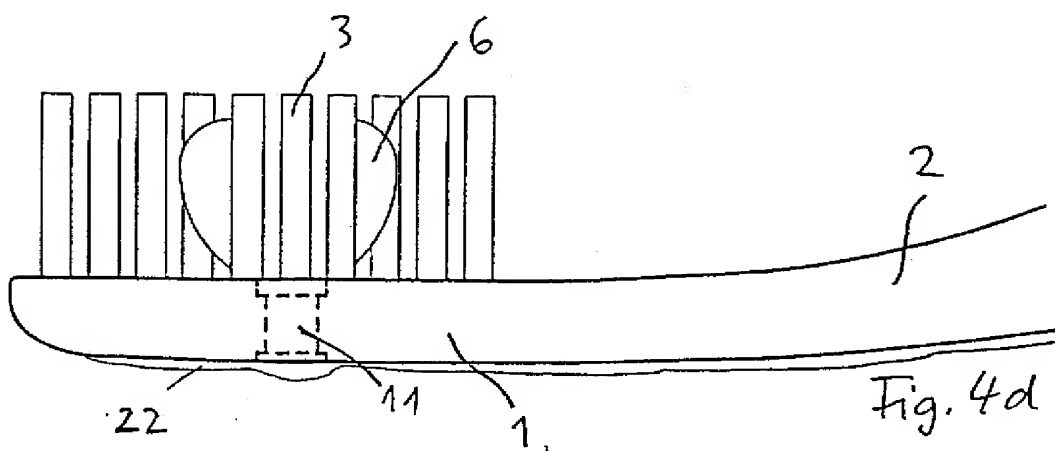
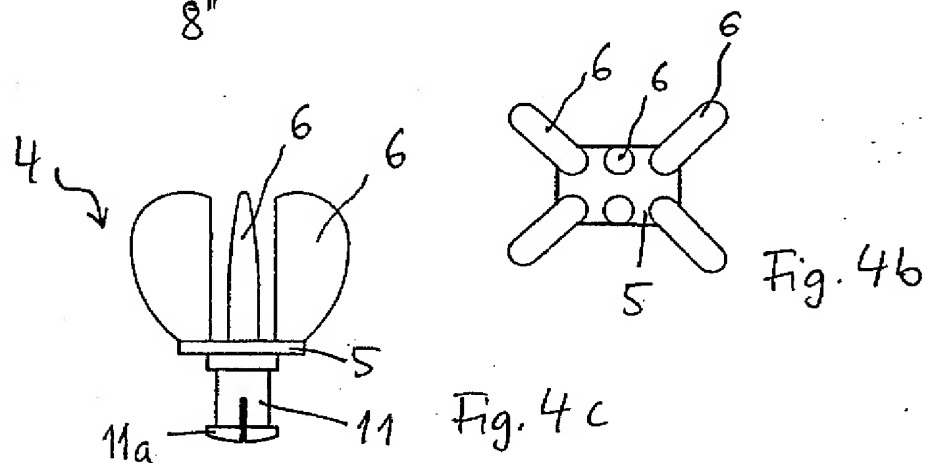
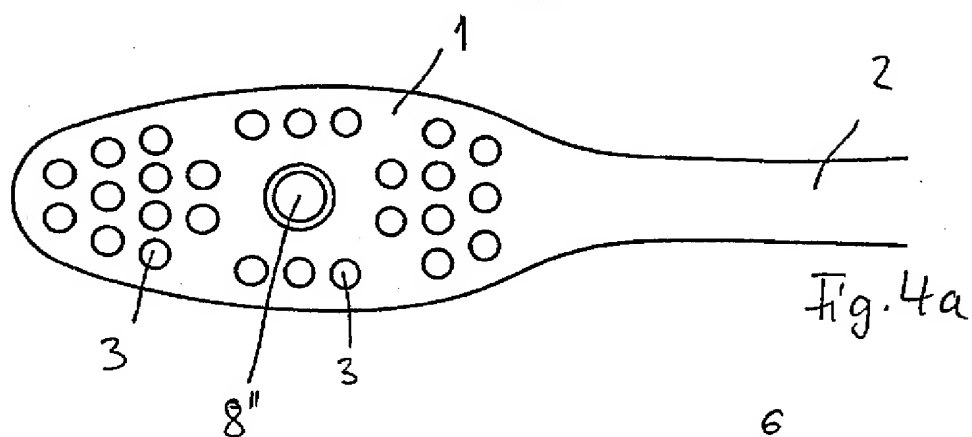
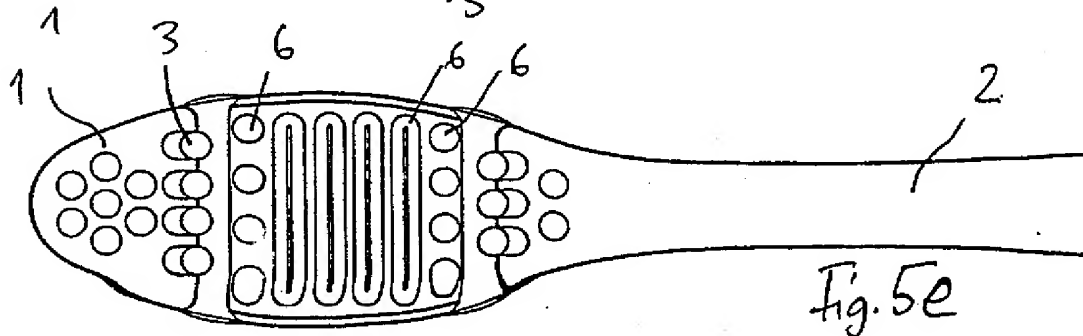
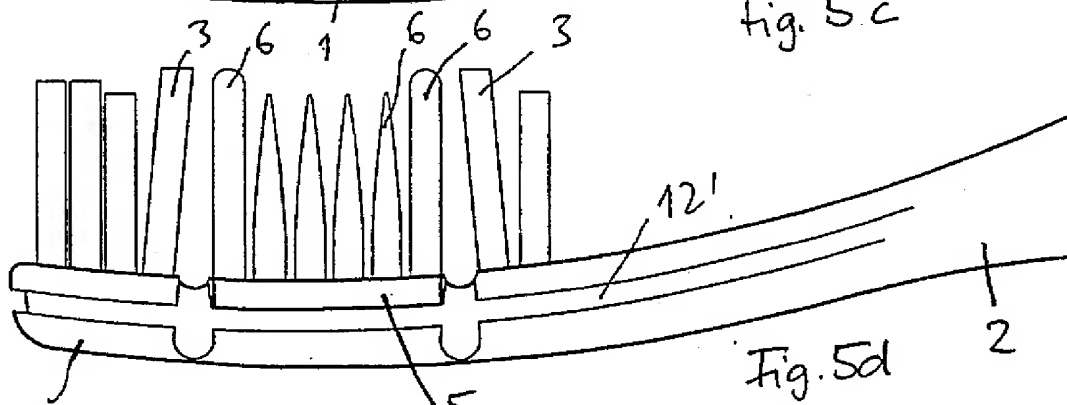
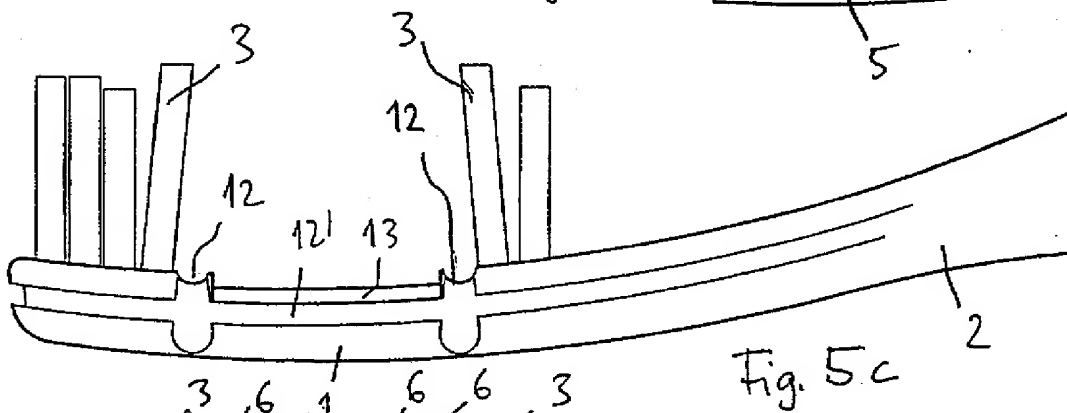
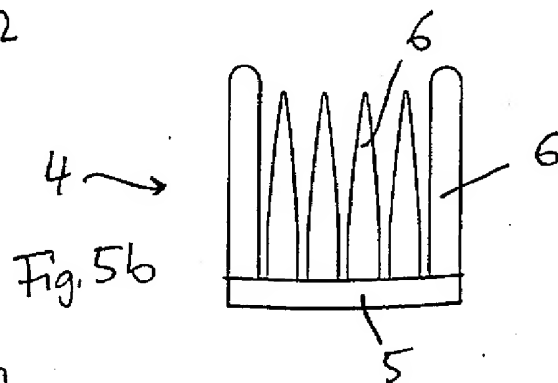
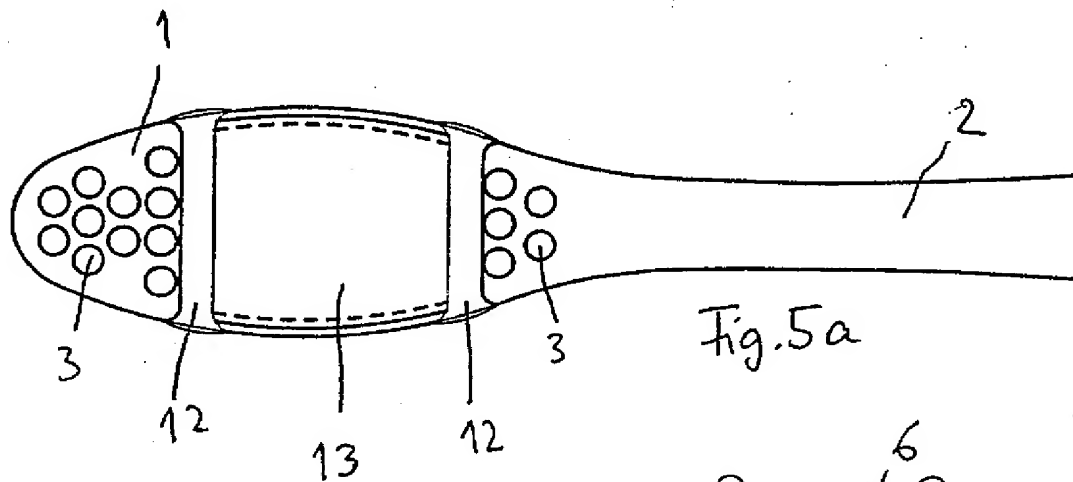
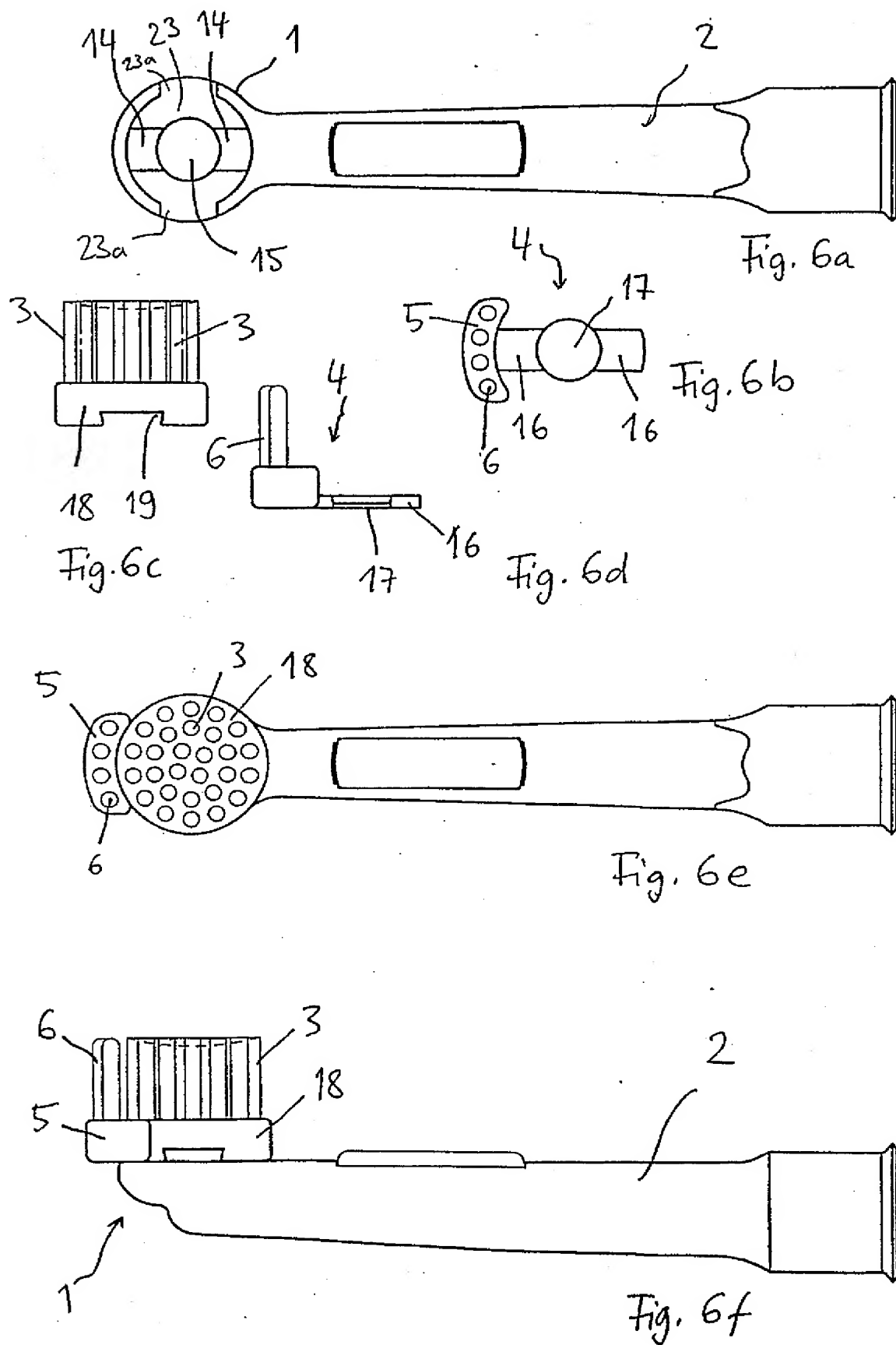
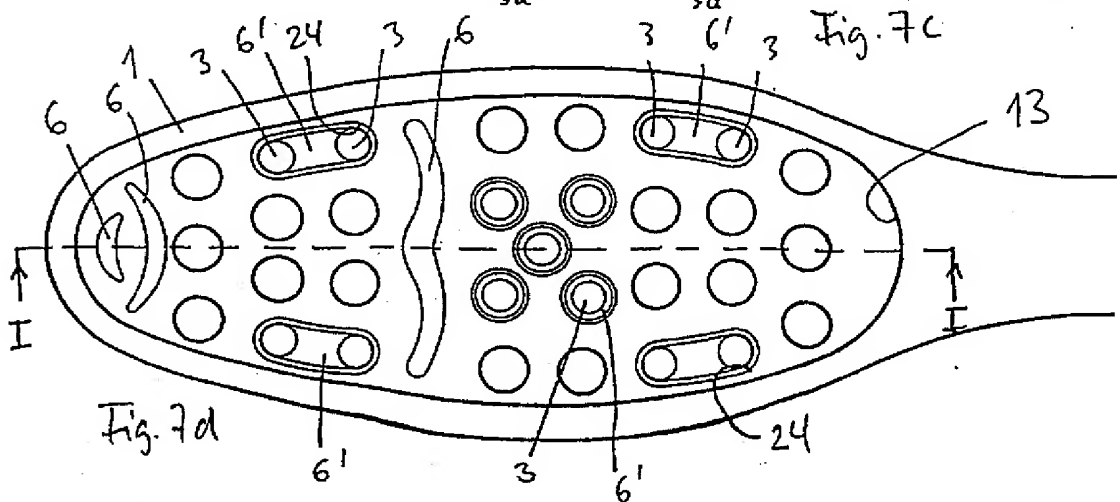
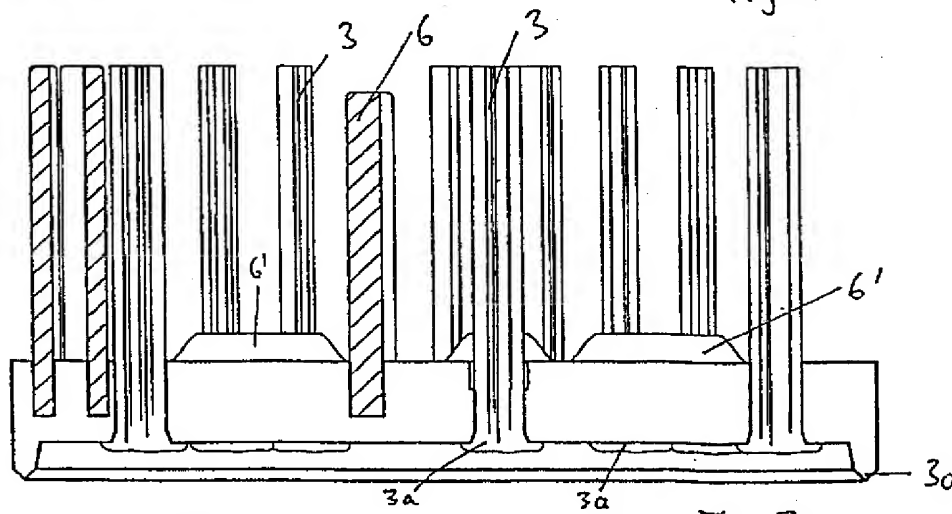
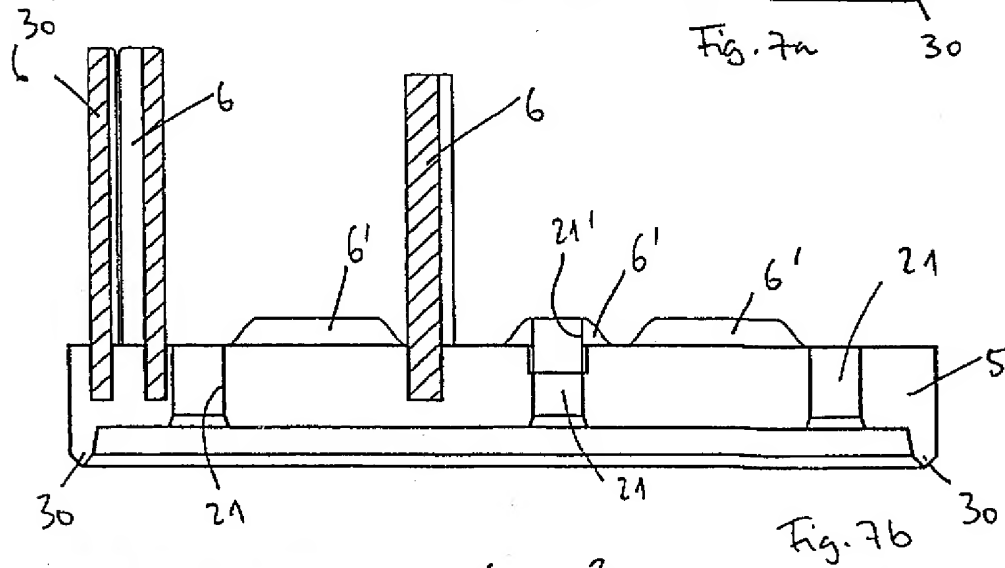
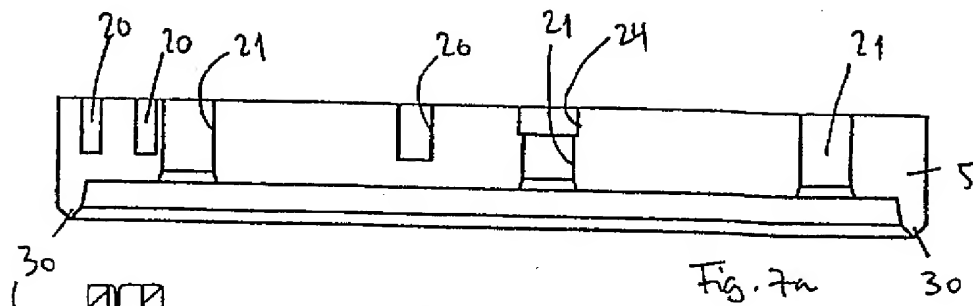


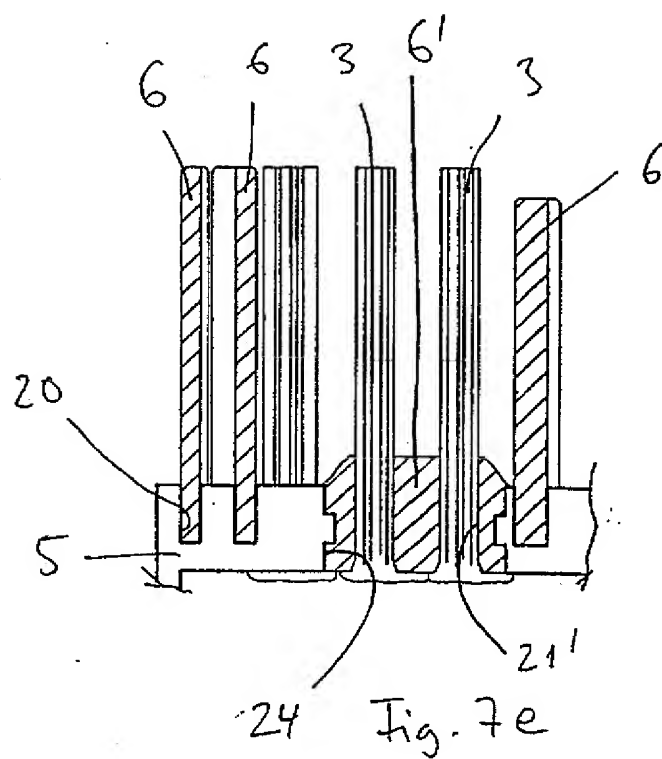
Fig. 3e

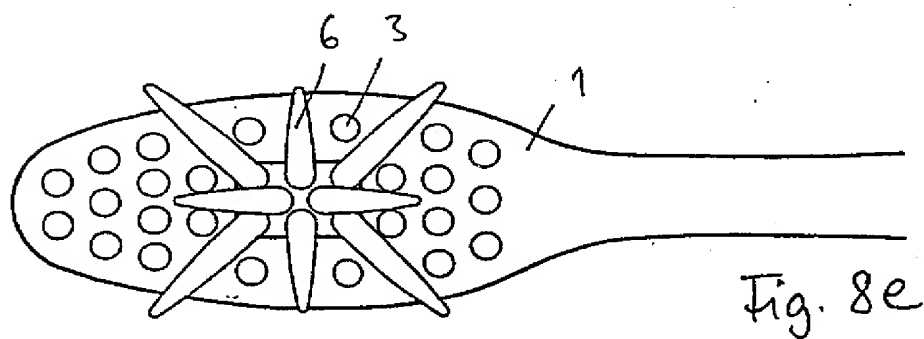
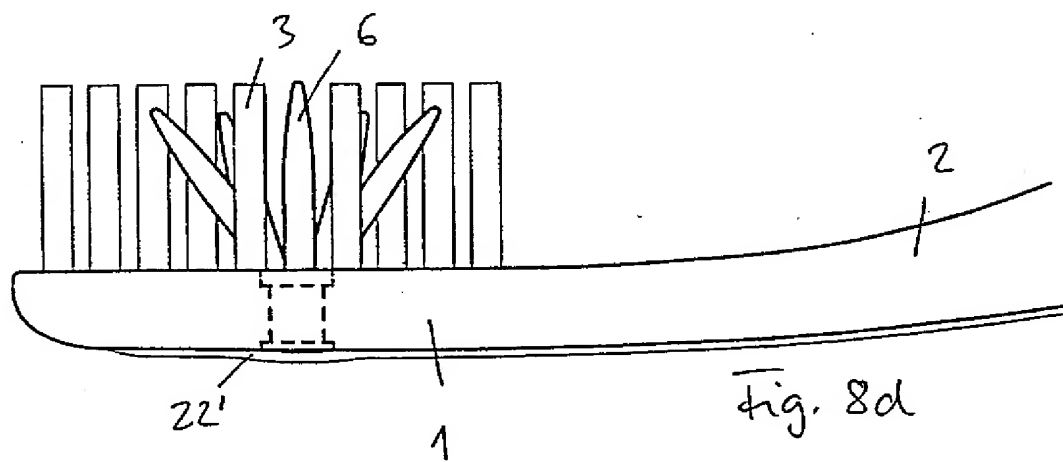
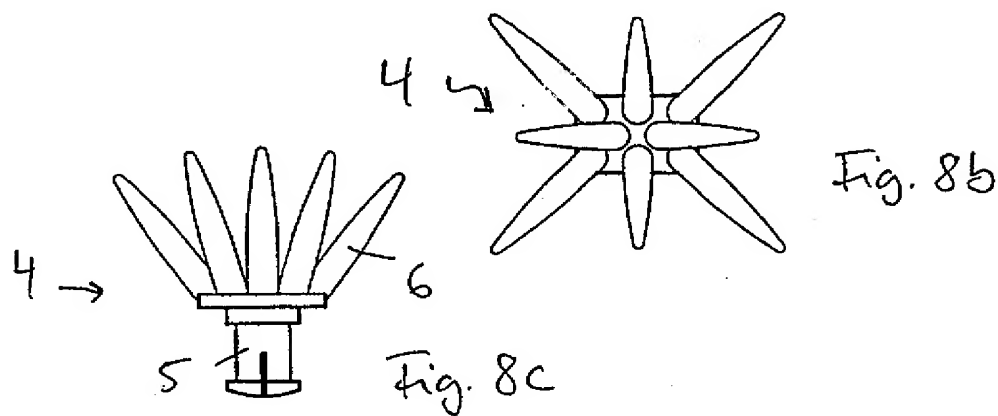
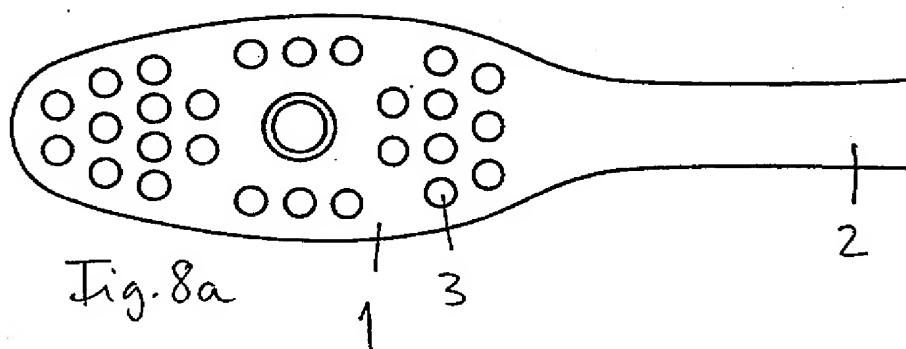












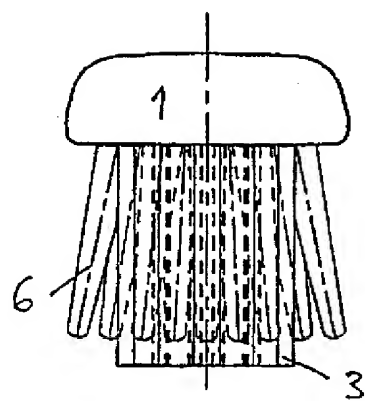


Fig. 9a

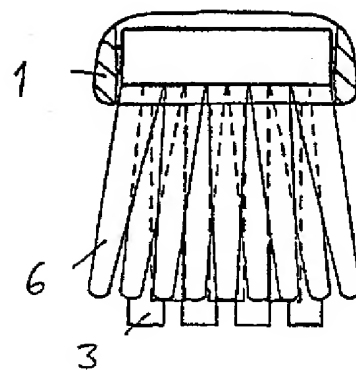


Fig. 9b

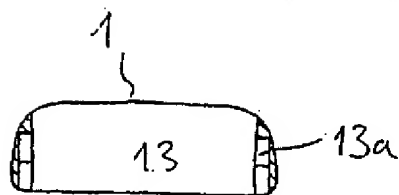


Fig. 9c

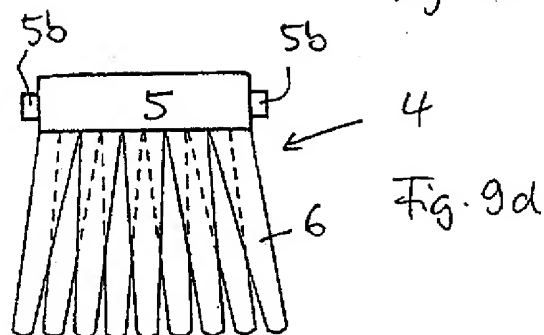


Fig. 9d

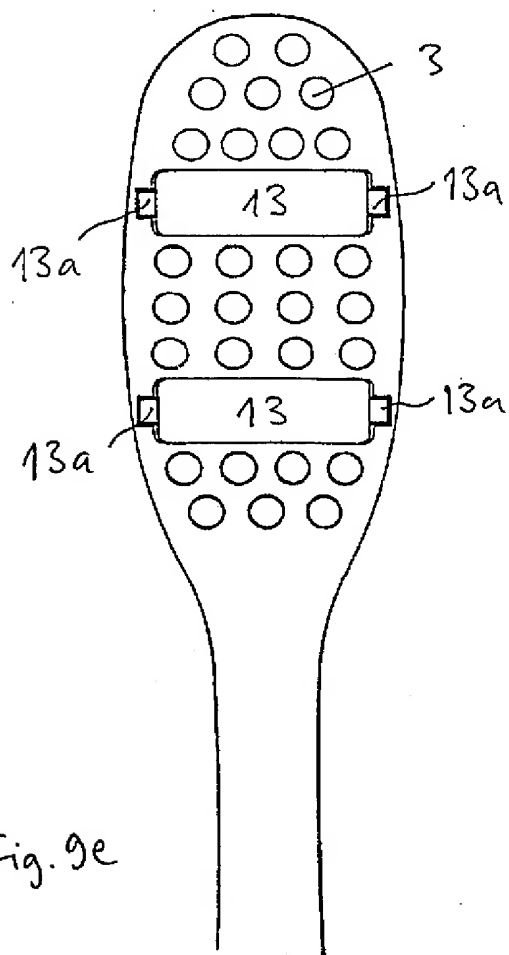


Fig. 9e

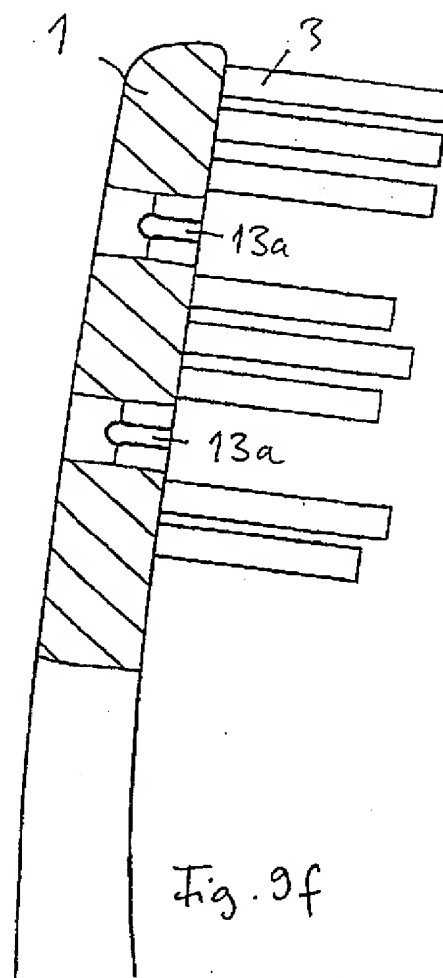
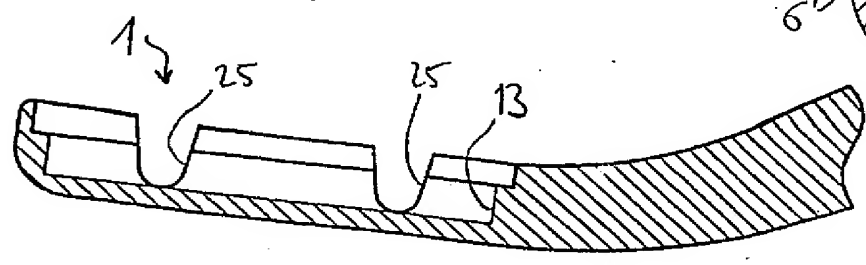
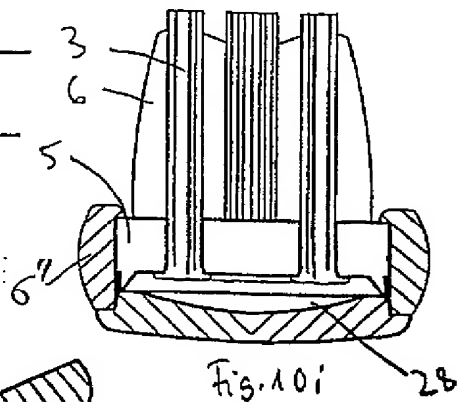
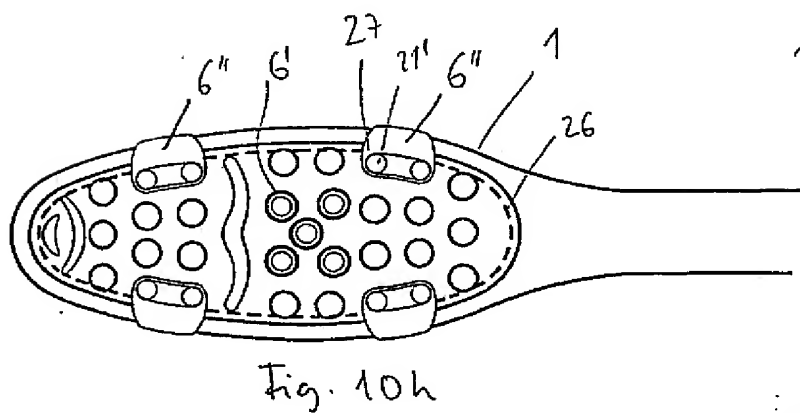
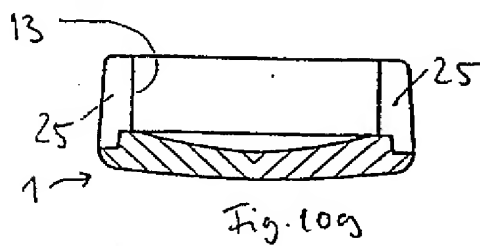
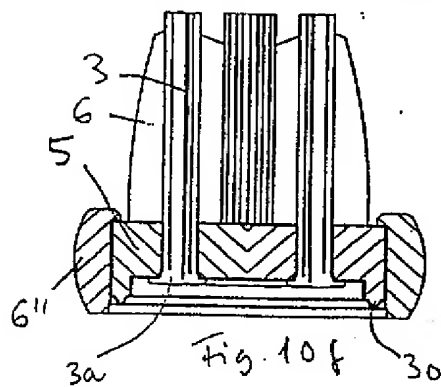
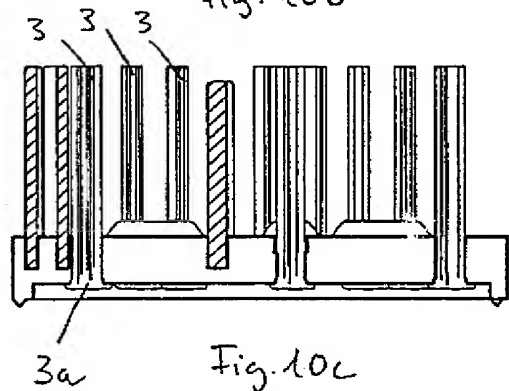
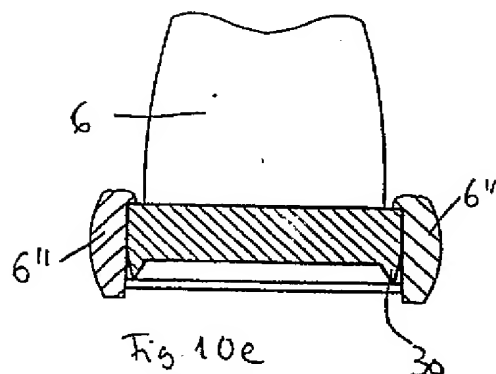
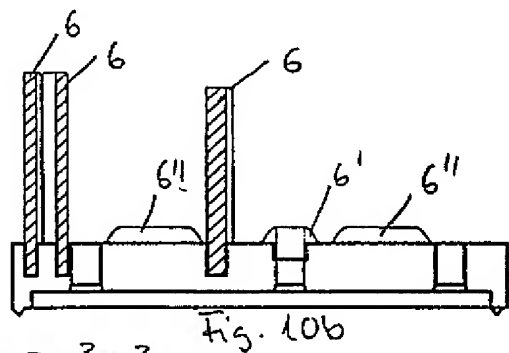
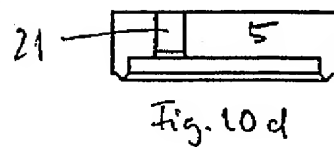
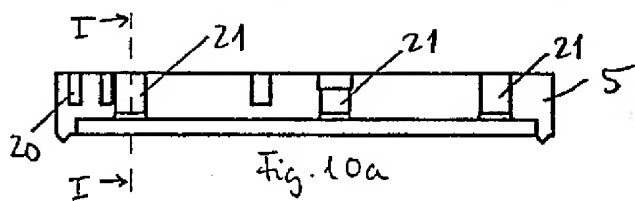


Fig. 9f



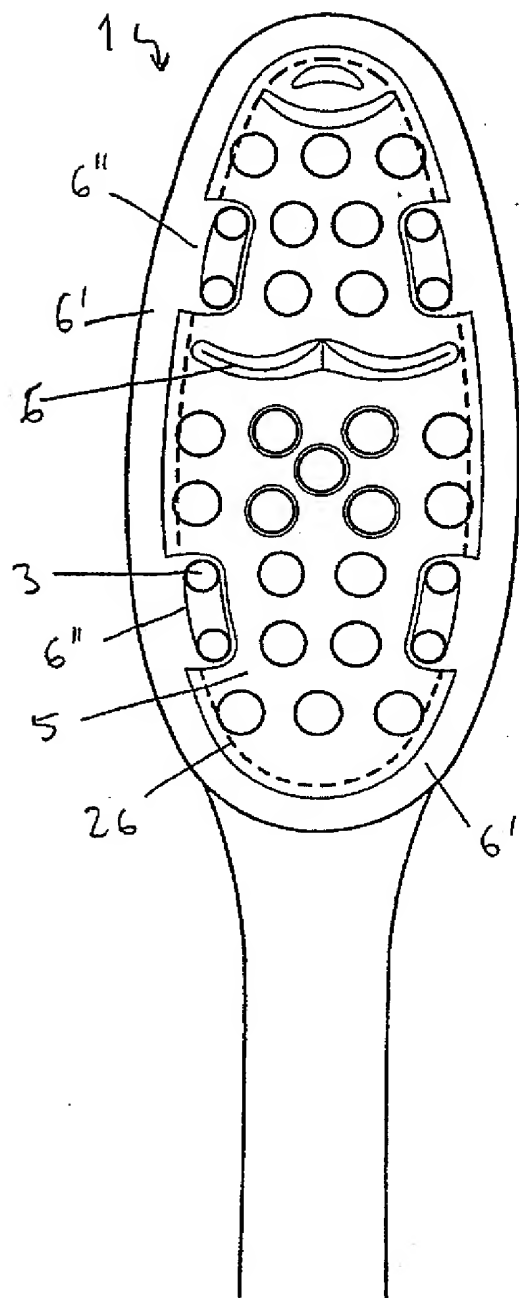


Fig. 11a

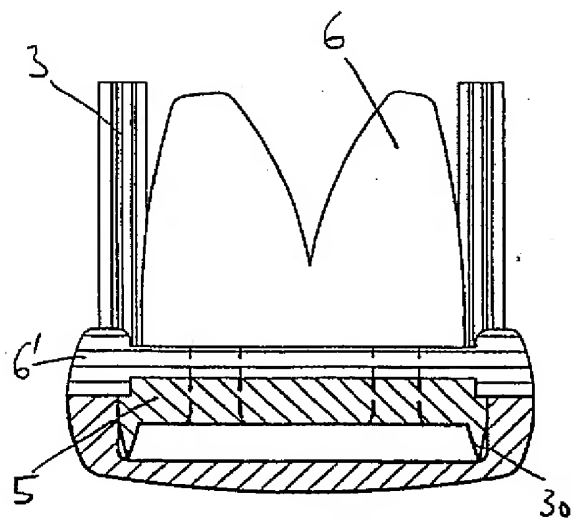


Fig. 11b

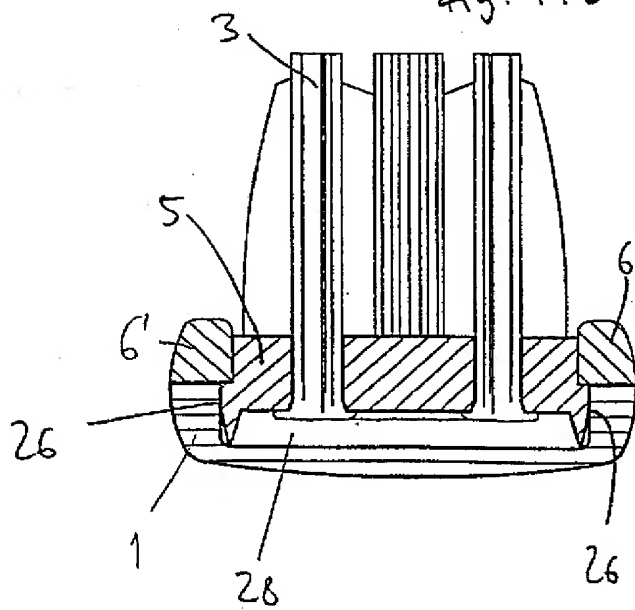


Fig. 11c

INTERNATIONAL SEARCH REPORT

Application No
PCT/CH 02/00717A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A46B9/06 A46B15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A46B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the passages | Relevant to claim No. |
|------------|--|----------------------------------|
| X | US 2 139 245 A (OGDEN FLOYD H) 6 December 1938 (1938-12-06) | 1,2, 4-11, 13-15, 17-21 |
| Y | column 1, line 49 -column 2, line 30; figures | 3,12,16 |
| Y | US 2 129 082 A (BYRER RALPH W) 6 September 1938 (1938-09-06) the whole document | 3 |
| Y | WO 00 76369 A (SOLANKI SANJAY AMRATLAL ;PROCTER & GAMBLE (US)) 21 December 2000 (2000-12-21) page 5, line 5 - line 9; figures | 12 |

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Date of the actual completion of the international search

8 May 2003

Date of mailing of the international search report

15/05/2003

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NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
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INTERNATIONAL SEARCH REPORT

Application No

PCT/CH 02/00717

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| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| Y | US 2 042 239 A (PLANDING ANDREW J) 26 May 1936 (1936-05-26) column 2, line 28 - line 37; figures ----- | 16 |
| P, X | WO 02 11583 A (GILLETTE CANADA COMPANY ;BREDALL WILLIAM A (US); BRAUN PHILLIP M () 14 February 2002 (2002-02-14) the whole document ----- | 1-21 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

Application No

PCT/CH 02/00717

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|---|---|---------------------|---|--|
| US 2139245 | A | 06-12-1938 | NONE | |
| US 2129082 | A | 06-09-1938 | NONE | |
| WO 0076369 | A | 21-12-2000 | AU 5870300 A CA 2373365 A1 EP 1187541 A2 WO 0076369 A2 | 02-01-2001 21-12-2000 20-03-2002 21-12-2000 |
| US 2042239 | A | 26-05-1936 | NONE | |
| WO 0211583 | A | 14-02-2002 | AU 8109301 A WO 0211583 A2 | 18-02-2002 14-02-2002 |

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
IPK 7 A46B9/06 A46B15/00

Nach der Internationalen Patentklassifikation (IPK) oder nach der nationalen Klassifikation und der IPK

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EPO-Internal, WPI Data, PAJ

C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

| Kategorie* | Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile | Betr. Anspruch Nr. |
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| Y | Spalte 1, Zeile 49 - Spalte 2, Zeile 30; Abbildungen | 3,12,16 |
| Y | US 2 129 082 A (BYRER RALPH W) 6. September 1938 (1938-09-06) das ganze Dokument | 3 |
| Y | WO 00 76369 A (SOLANKI SANJAY AMRATLAL ; PROCTER & GAMBLE (US)) 21. Dezember 2000 (2000-12-21) Seite 5, Zeile 5 - Zeile 9; Abbildungen | 12 |



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Bevollmächtigter Bediensteter

Gavaza, B

C.(Fortsetzung) ALS WESENTLICH ANGESEHENE UNTERLAGEN

| Kategorie ^a | Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile | Betr. Anspruch Nr. |
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| Y | US 2 042 239 A (PLANDING ANDREW J) 26. Mai 1936 (1936-05-26) Spalte 2, Zeile 28 - Zeile 37; Abbildungen ---- | 16 |
| P,X | WO 02 11583 A (GILLETTE CANADA COMPANY ;BREDALL WILLIAM A (US); BRAUN PHILLIP M () 14. Februar 2002 (2002-02-14) das ganze Dokument ----- | 1-21 |

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|--|---|-------------------------------|-----------------------------------|------------|-------------------------------|
| US 2139245 | A | 06-12-1938 | KEINE | | |
| US 2129082 | A | 06-09-1938 | KEINE | | |
| WO 0076369 | A | 21-12-2000 | AU | 5870300 A | 02-01-2001 |
| | | | CA | 2373365 A1 | 21-12-2000 |
| | | | EP | 1187541 A2 | 20-03-2002 |
| | | | WO | 0076369 A2 | 21-12-2000 |
| US 2042239 | A | 26-05-1936 | KEINE | | |
| WO 0211583 | A | 14-02-2002 | AU | 8109301 A | 18-02-2002 |
| | | | WO | 0211583 A2 | 14-02-2002 |



US 2004/0177462A1

(19) **United States**(12) **Patent Application Publication****Brown, JR. et al.**(10) **Pub. No.: US 2004/0177462 A1**(43) **Pub. Date: Sep. 16, 2004**(54) **TOOTHBRUSH HEAD**

(75) **Inventors:** William R. Brown JR., Peabody, MA (US); Thomas A. Christman, Lexington, MA (US); Joseph A. DePuydt, Quincy, MA (US); Ronald R. Duff JR., Shrewsbury, MA (US); Edward J. Mangan, Southborough, MA (US); Phillip M. Braun, Exeter, RI (US); Karen Claire-Zimmer, Waltham, MA (US); Helge Zimmer, Waltham, MA (US); Joanna Q. Deng, Brookline, MA (US); Rudolf Majthan, Eschborn (DE); Rainer Hans, Waldems (DE)

(73) **Assignee: The Gillette Company**(21) **Appl. No.: 10/389,448**(22) **Filed: Mar. 14, 2003****Publication Classification**(51) **Int. Cl.⁷ A46B 9/04**(52) **U.S. Cl. 15/167.1; 300/21; 15/188; 15/194**(57) **ABSTRACT****Correspondence Address:**

The Gillette Company
Patent & Trademark Counsel
Prudential Tower Bldg., 39th Floor
800 Boylston Street
Boston, MA 02199 (US)

A toothbrush head has a tooth cleaning element extending from the head. The head is divided into at least two portions which can be moved independent of each other. The tooth cleaning element is rotatable relative to that portion of the head from which it extends.

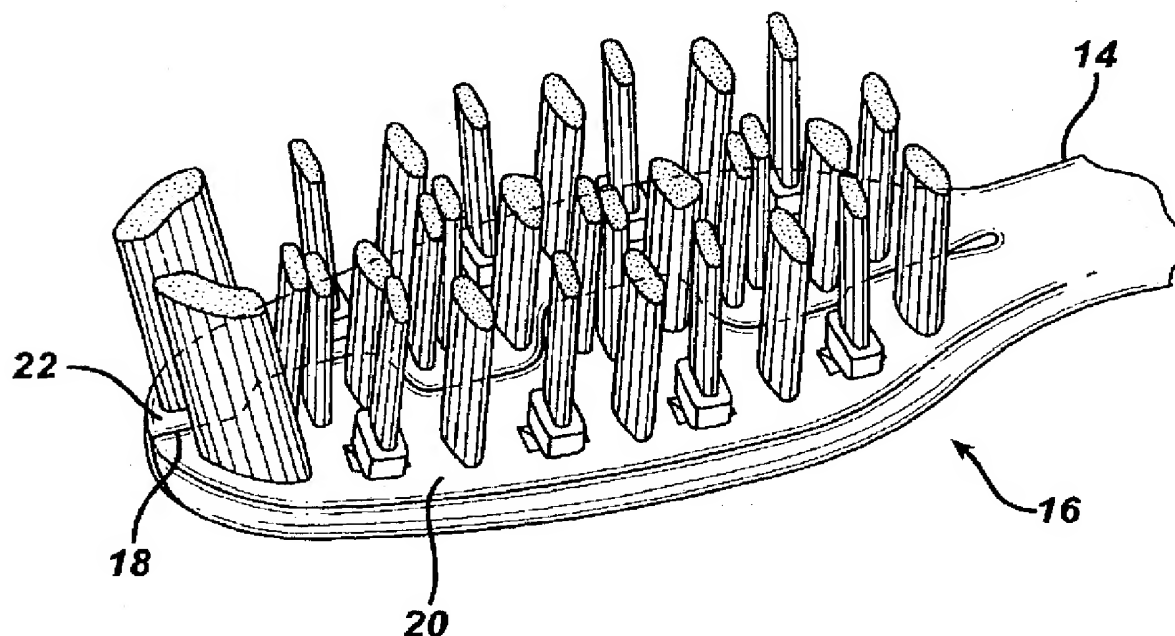


FIG. 1

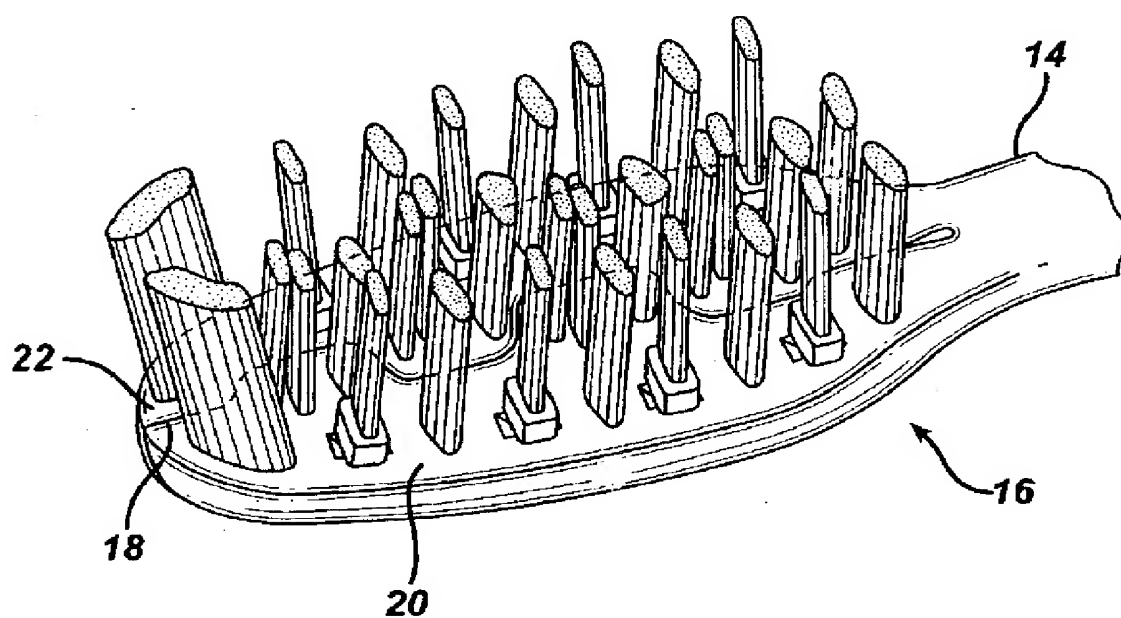


FIG. 2

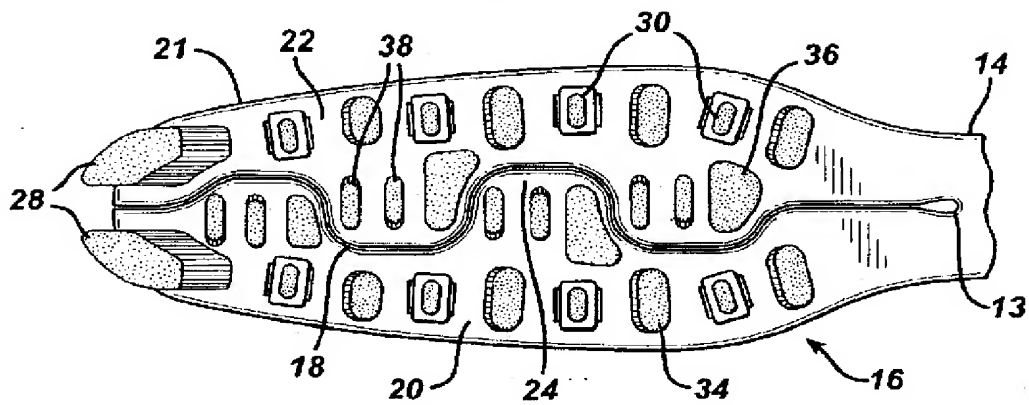


FIG. 3

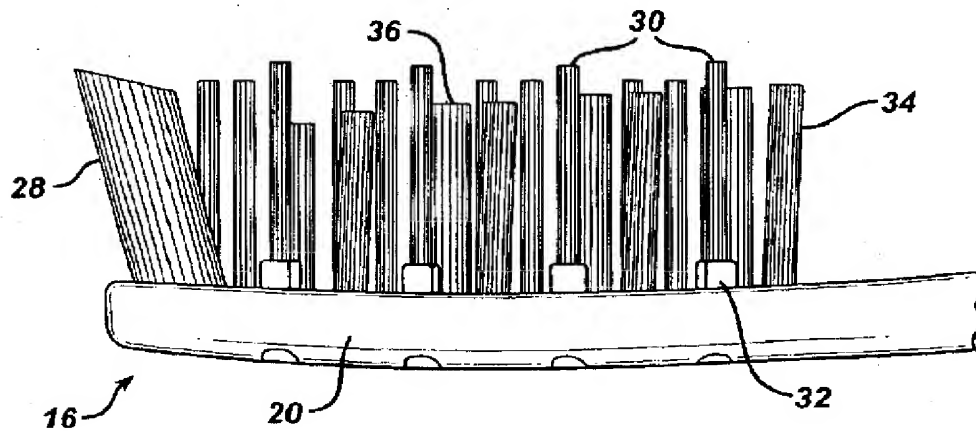


FIG. 4

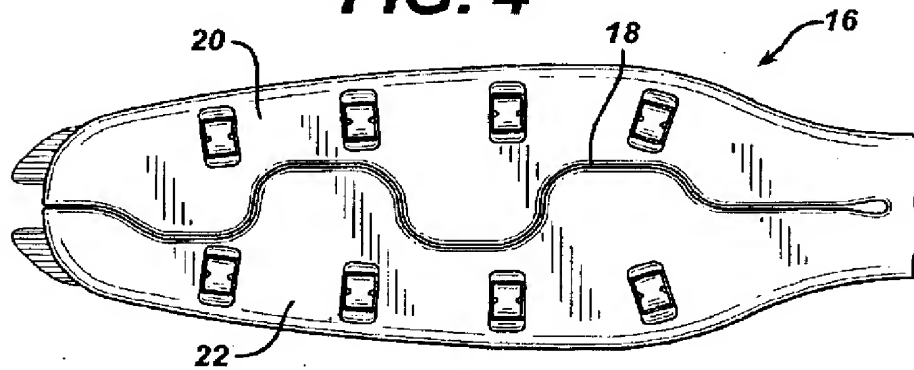


FIG. 5

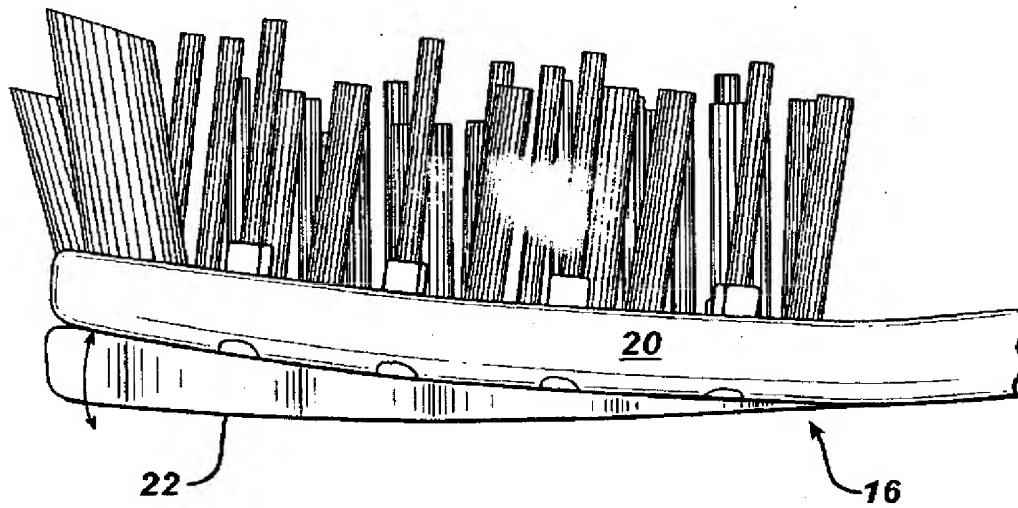


FIG. 6

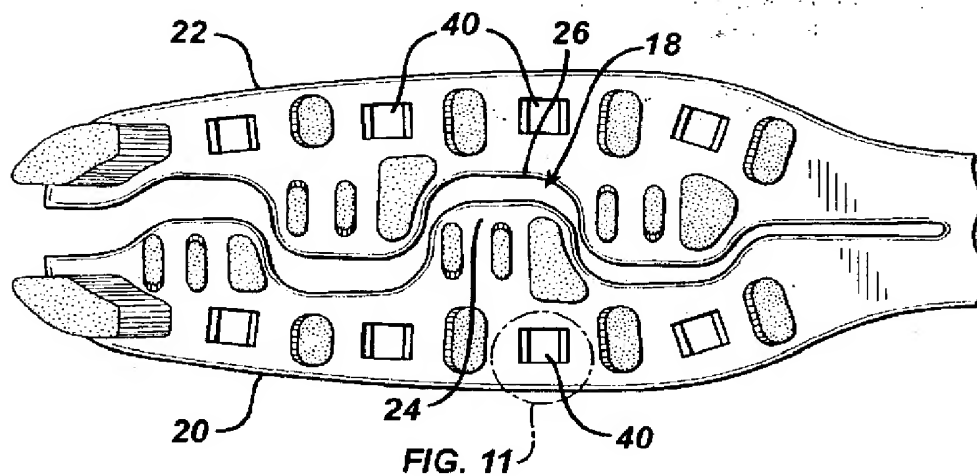


FIG. 7

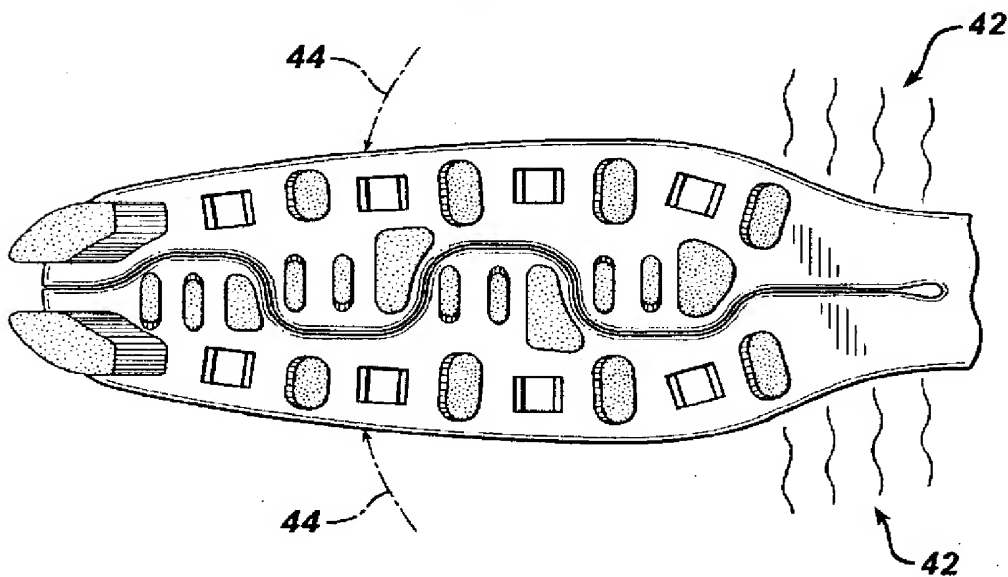


FIG. 8

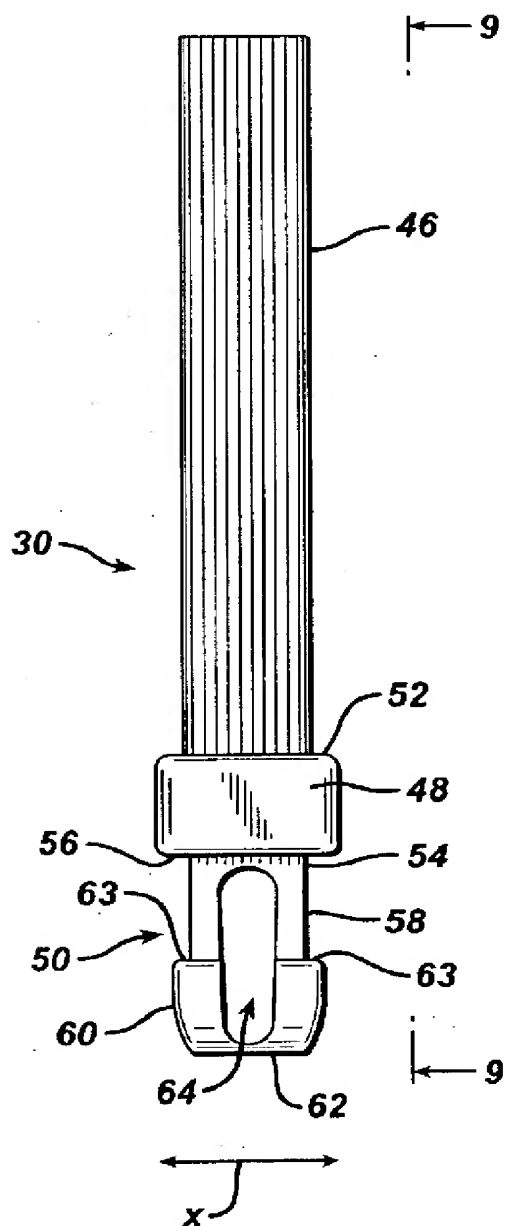


FIG. 9

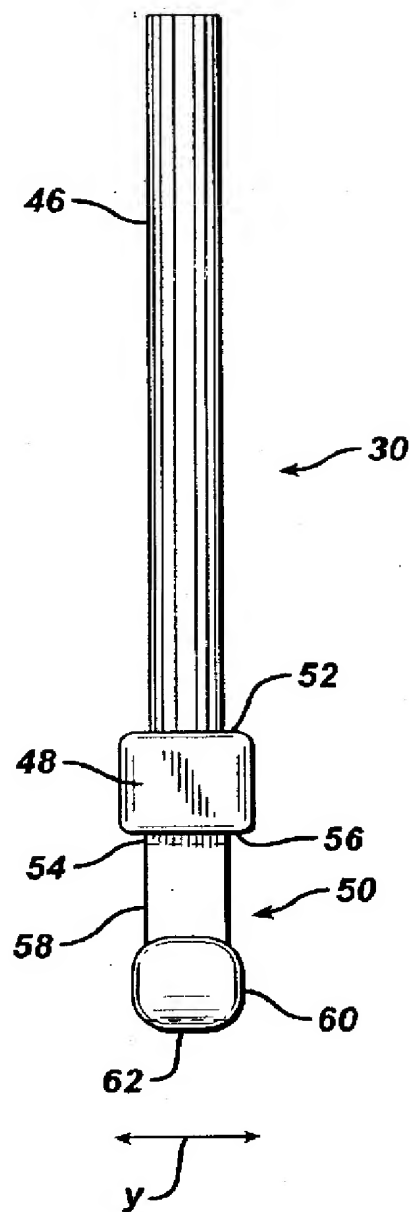


FIG. 10

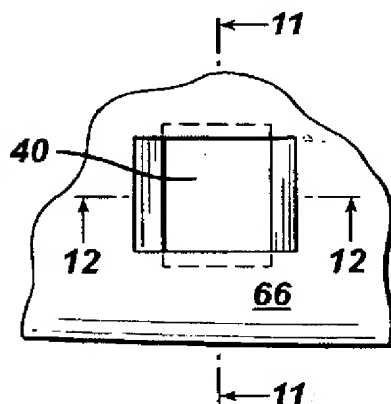


FIG. 11

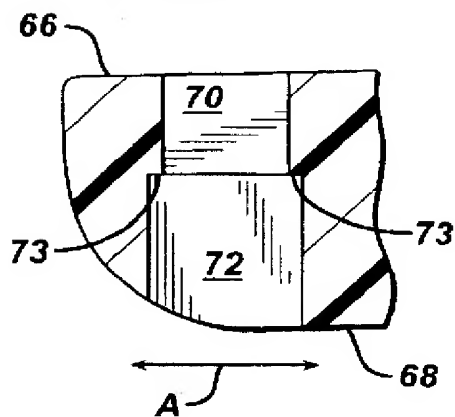


FIG. 12

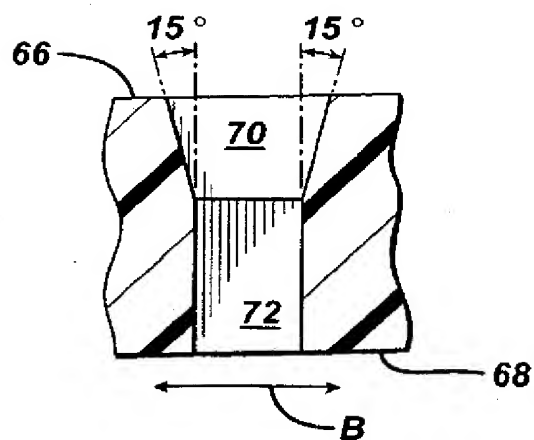


FIG. 13

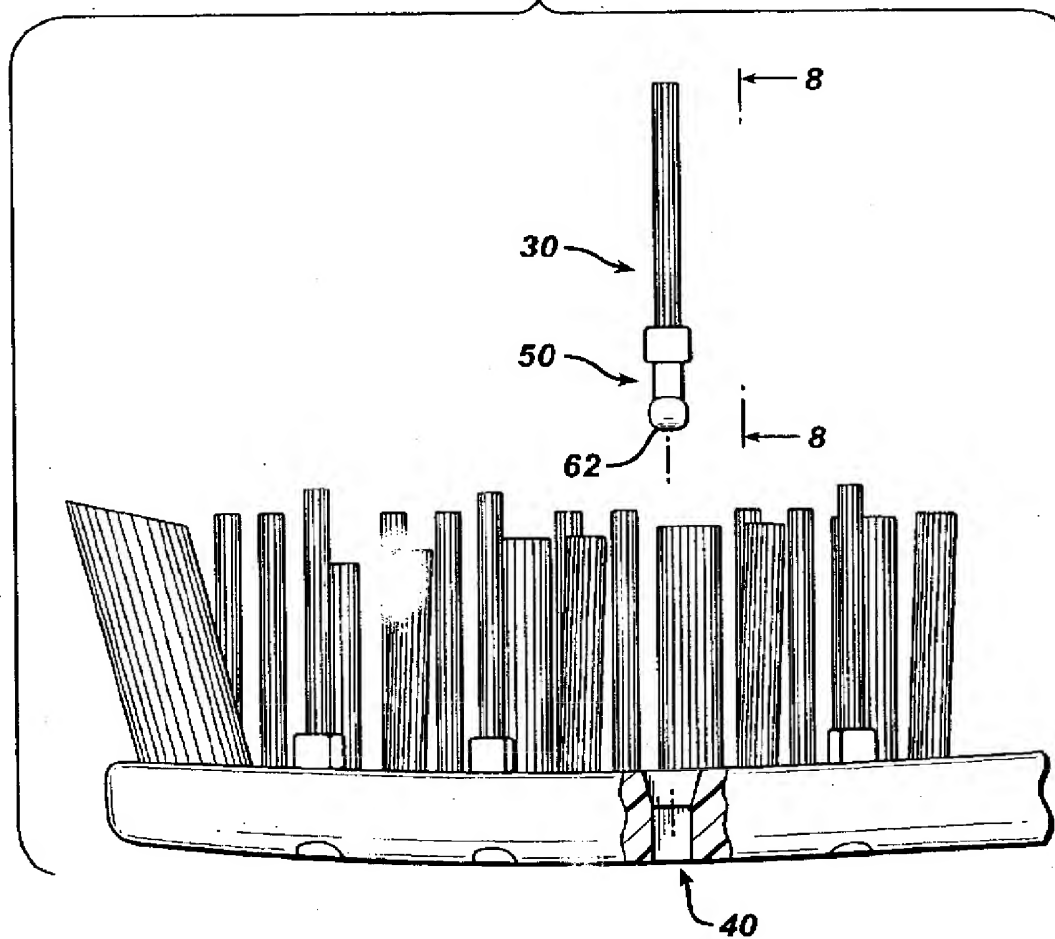


FIG. 14

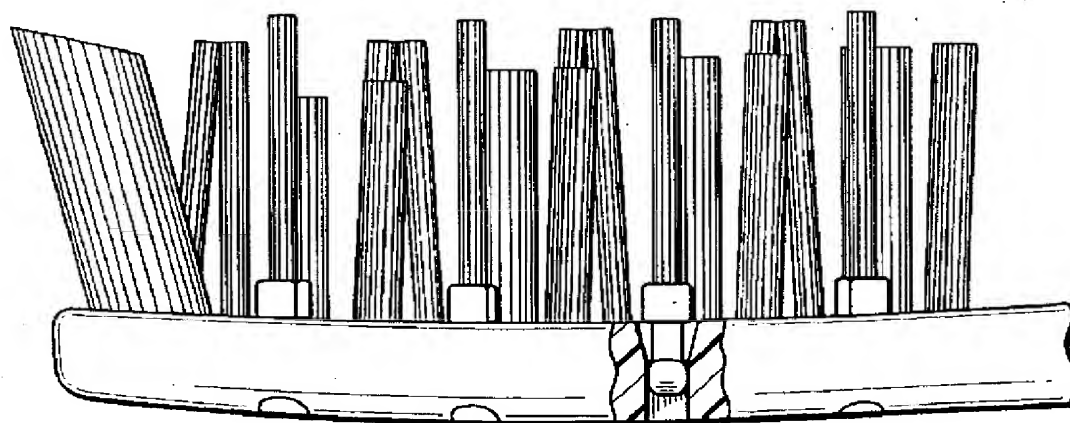
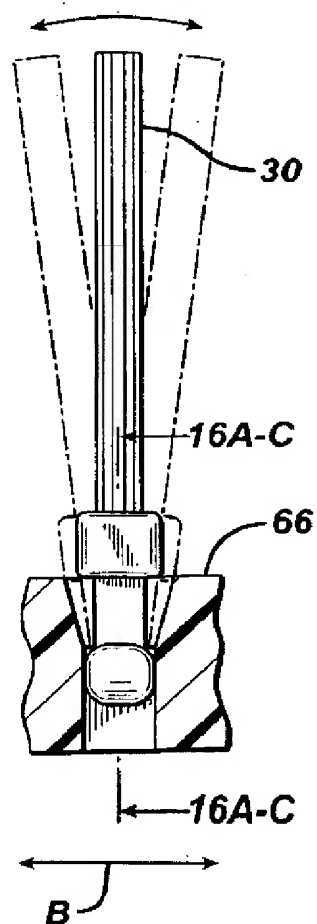


FIG. 15



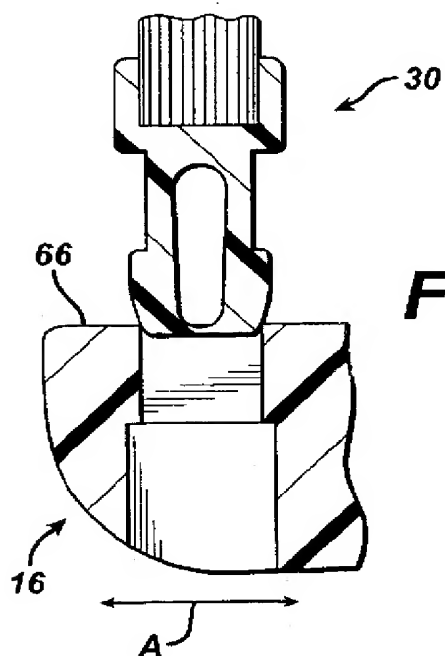


FIG. 16A

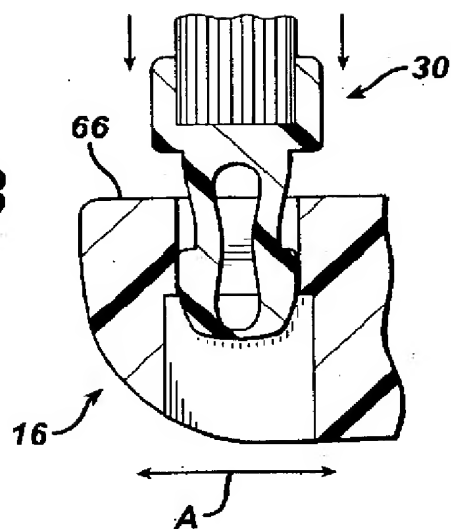


FIG. 16B

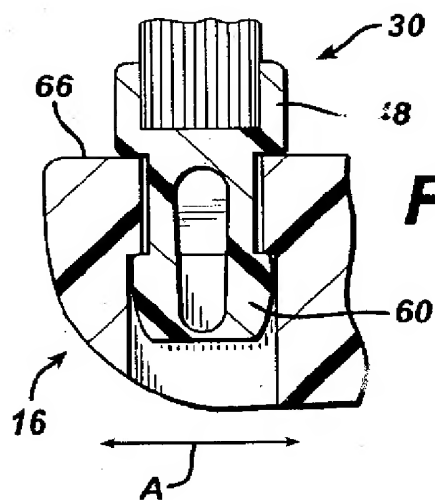


FIG. 16C

FIG. 17

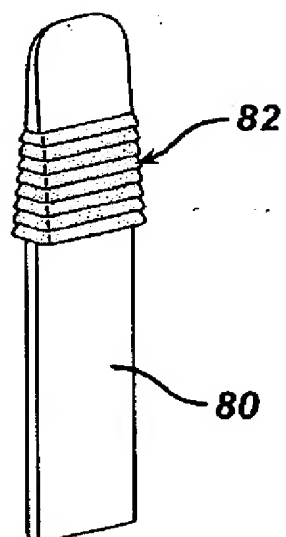
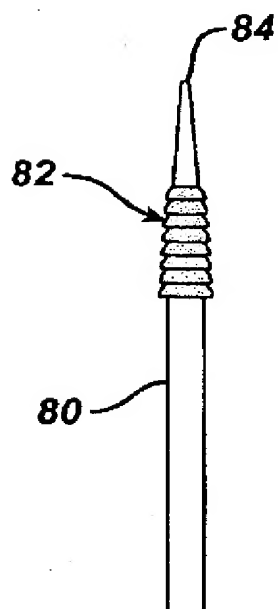


FIG. 18



TOOTHBRUSH HEAD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Cross-reference is made to U.S. patent application Ser. No. 09/526,679 filed on Mar. 16, 2000 and Ser. No. 09/576,590 filed on May 22, 2000, both of which are assigned to Gillette Canada Company.

FIELD OF THE INVENTION

[0002] The invention relates generally to the field of oral care, and in particular to toothbrushes. More specifically, the invention relates to a toothbrush head having one or more pivoting tufts of bristles, the head having two portions that can move independent of each other.

BACKGROUND OF THE INVENTION

[0003] A Japanese patent document having an application number of 3-312978 discloses a toothbrush having a multiplicity of tufts of nylon bristles. In a first embodiment shown in FIGS. 1, 2 and 3, a plurality of cylindrical recessed sections in the head are set orthogonally to the longitudinal axial direction of a shank and are formed at equal intervals. Column-shaped rotary bodies 5 are respectively contained in the recessed sections. On the peripheral surfaces of the rotary bodies 5, along the axial direction, projected strip sections 5a are formed, and they are set in a state that they are positioned at the opening sections of the recessed sections. At the opening sections of the recessed sections, contact surfaces to be positioned on both the sides are formed. At both the ends of the upper surfaces of the projected strip sections 5a, nylon bristles 6 are arranged to be vertically erected.

[0004] As shown in FIG. 3, the arrangement described above allows bristles 6 to rotate during use of the brush. A problem with this brush is that two tufts of bristles are secured to each strip section 5a and thus must rotate in unison. As a result, an individual tuft of bristles cannot rotate independently of its "partner" tuft. The individual tuft may thus be prevented from achieving optimal penetration between two teeth during brushing because the partner tuft might contact the teeth in a different manner and interfere with rotation of the individual tuft.

[0005] FIGS. 4, 5 and 6 disclose a second embodiment in which each tuft of bristles is secured to the head by a ball and socket type arrangement. While this embodiment allows each tuft of bristles to swivel independent of the other tufts, it does have disadvantages. If a tuft of bristles is tilted out towards the side of the head and that tuft is positioned at the interface between the side and top surfaces of the head, the chances are increased that the bristle tips will not even contact with the teeth during brushing. Further, the random orientation in which the tufts can end up after brushing detracts from the attractiveness of the brush.

[0006] The Japanese reference also discloses that the brush head is made of a unitary structure. As such, water cannot flow through any central portion of the brush head, thereby inhibiting the cleanability of the brush. Further, the unitary head structure does not allow different portions of the head to move independently of each other. Accordingly, the bristle tufts extending from the tuft cannot accommodate

the varying tooth surfaces as well as a brush in which the head has two or more portions that can move or flex independent of each other.

SUMMARY OF THE INVENTION

[0007] The present invention is directed to overcoming one or more of the problems set forth above. Briefly summarized, according to one aspect of the present invention, a toothbrush head has a tooth cleaning element extending from the head. The head is divided into at least two portions which can be moved independent of each other. The tooth cleaning element is rotatable relative to that portion of the head from which it extends.

[0008] According to another aspect of the invention, a tooth cleaning element includes one or more tooth cleaners, a base support, and an anchor pivot. One end of the one or more tooth cleaners is secured to a first end of the base support. One end of the anchor pivot is secured to a second end of the base support. The anchor portion has a larger section further from the base support than a smaller section of the anchor portion.

[0009] In accordance with a third aspect of the invention, a method of making a toothbrush head includes molding a plastic toothbrush head in a mold. The head has two distinct portions which are spaced a predetermined distance from each other. The head is removed from the mold. At least that part of the head where the two head portions connect is heated. The two head portions are moved towards each other. At least that part of the head where the two head portions connect is cooled such that the two head portions will now remain in positions where they will be spaced apart a distance which is less than the predetermined distance.

[0010] According to a fourth aspect of the invention, a method of making a toothbrush head includes molding a plastic toothbrush head in a mold. The head has at least one hole therein which extends all the way through the head. The head is removed from the mold. A tooth cleaning element is inserted into the hole.

[0011] These and other aspects, objects, features and advantages of the present invention will be more clearly understood and appreciated from a review of the following detailed description of the preferred embodiments and appended claims, and by reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a perspective view of the toothbrush head of FIG. 1;

[0013] FIG. 2 is a top view of the head of FIG. 1;

[0014] FIG. 3 is a side view of the head of FIG. 1;

[0015] FIG. 4 is a bottom view of the head of FIG. 1;

[0016] FIG. 5 is a side view of the head of FIG. 1 showing one of the head portions flexing;

[0017] FIG. 6 is a top view of the head of FIG. 1 with the two head portions separated from each other;

[0018] FIG. 7 is a top view of the head of FIG. 1 after the head portions have been positioned closer to each other;

[0019] FIG. 8 is a front view of a pivoting tuft taken along the lines 8-8 of FIG. 13;

[0020] FIG. 9 is a side view of the pivoting tuft of FIG. 8 taken along lines 9-9;

[0021] FIG. 10 is a top view of one of the holes in the head for receiving the pivoting tuft (see FIG. 6);

[0022] FIG. 11 is a sectional view of FIG. 10 taken along lines 11-11;

[0023] FIG. 12 is a sectional view of FIG. 10 taken along lines 12-12;

[0024] FIG. 13 is a side view of the head of FIG. 1 (a portion is removed to facilitate viewing) and a pivoting tuft prior to insertion into the head;

[0025] FIG. 14 is a side view of the head of FIG. 1 (a portion is removed to facilitate viewing) and a pivoting tuft after insertion into the head;

[0026] FIG. 15 is a side view of the pivoting tuft showing its motion;

[0027] FIGS. 16A-C are sectional views of FIG. 15 taken along the lines 16A-C-16A-C;

[0028] FIG. 17 is a perspective view of a tooth cleaner in the form of a ribbed fin; and

[0029] FIG. 18 is a side view of the ribbed fin of FIG. 17.

DETAILED DESCRIPTION OF THE BEST MODE

[0030] Beginning with FIGS. 1-5, there is shown a toothbrush head 16 which extends from a neck 14 which extends from a handle (not shown) to form a toothbrush. The type of handle is not germane to the present invention. The head and handle are preferably made of polypropylene. The head has a serpentine split 18 which divides the head into two portions 20 and 22. An end of the split 13 near neck 14 is preferably circular in shape (see FIG. 2). As shown in FIG. 5, the split in the head allows portions 20 and 22 to flex or move independent of each other during use of the toothbrush, thus facilitating cleaning of the teeth.

[0031] Split 18 can also be defined as an opening in the head between head portions 20 and 22. This opening allows water to flow through the head, thereby enhancing cleaning of the top head surface which typically gets caked with toothpaste in spite of efforts to rinse the head clean.

[0032] Head portion 20 includes a projecting part 24 which fits (at least partially) into a recess 26 (see FIG. 6) defined by portion 22. Projecting part 24 has several tufts of bristles extending from it (to be described in further detail below) and is surrounded on three sides by head portion 22.

[0033] Referring now to FIGS. 2 and 3, each of the tufts of bristles on head 16 will be described. A first pair of tufts 28 are located towards the free end of the head, one on each head portion 20, 22. Each tuft has bristles (tooth cleaners) which preferably are each made of polybutylene-terephthalate (PBT) and have a diameter of 0.007 inches. The shortest bristles in tuft 28 have a length of 0.420 inches with the remaining bristles increasing in length steadily to a tip of the tuft. Each tuft tilts away from the handle by an angle of preferably about 12 degrees relative to that portion of the

surface of the head from which it projects. As shown in FIG. 2, tufts 28 have a larger cross-section than any other tuft on the head.

[0034] A second group of tufts are pivoting tufts 30 (the only tufts on the head which are rotatable). There are four tufts 30 on each head portion 20, 22 which are located towards the outside of the head. Each tuft 30 can pivot up to about 15 degrees to either side of a vertical position on the head, more preferably being able to pivot up to about 8 degrees to either side of a vertical position on the head. The pivoting of tufts 30 is roughly towards or away from neck 14. Each tuft 30 includes a base support 32 made of polypropylene. The bristles are made of polyamid 6.12, have a diameter of 0.008 inches and extend 0.420 inches above the base support.

[0035] A third group of tufts 34 extend perpendicular to the head. There are four tufts 34 on each head portion 20, 22 which alternate with tufts 30. When viewed from the top (FIG. 2) the tufts are oval in shape (similar to tufts 30 but larger). In other words, the tufts 34 and 30 have oval shaped cross-sections. Each tuft 34 has bristles which are made of polyamid 6.12, have a diameter of 0.006 inches and extend above the head by about 0.385 inches.

[0036] A fourth group of tufts 36 are located towards the inside of the head. There are two such tufts on each head portion 20, 22. Each tuft 36 extends perpendicular to the head. The bristles of tuft 36 have a diameter of 0.006 inches, are made of polyamid 6.12 and rise about 0.360 inches above the head.

[0037] A fifth and final group of tufts 38 are also located towards the inside of the head (away from a perimeter 21 of the head). There are 4 pairs of tufts 38. In each pair one tuft is closer to neck 14 than the other tuft. In each pair of tufts 38, (a) a base of one tuft is closer to a first side of the head and this one tuft leans towards a second side of the head, and (b) a base of the other tuft is closer to the second side of the head and this other tuft leans towards the first side of the head. As such, the tufts in each pair lean across each other. The angle of tilt towards the side of the head is about five degrees. Each tuft 38 bristles which are made of PBT, have a bristle diameter of about 0.007 inches and extend about 0.460 inches above head 16. Each tuft 38 has an oval cross-section with a long dimension of the oval being oriented in the direction of tilt.

[0038] The bristles used on the head can be crimped (see U.S. Pat. No. 6,058,541) or notched (see U.S. Pat. No. 6,018,840). Other types of tooth cleaners besides bristles can be used. For example, a tuft of bristles could be replaced by an elastomeric fin. The US patents listed in this paragraph are incorporated herein by reference.

[0039] Turning now to FIG. 6, a description will now be provided as to how the toothbrush (head) is made. In a first step, the head, neck and handle of the toothbrush are injection molded in a mold. During this injection molding step, tufts 28, 34, 36 and 38 are secured in the head by a hot-tufting process. Hot-tufting processes are notoriously well known by those skilled in the art (see e.g. U.S. Pat. No. 4,635,313; and 6,361,120; British patent application 2,330,791; and European patent application 676,268 A1).

[0040] Briefly, hot-tufting involves presenting ends of a multiplicity of groups of plastic filaments into a mold. Each

group of filament ends inside the mold is optionally melted into a blob. Each filament group is cut to a desired length (either before or after being introduced into the mold) to form a tuft of bristles. The mold is closed and molten plastic is injected into the mold. When the plastic solidifies, it locks one end of the tufts of bristles into the head of the toothbrush.

[0041] It can be seen in FIG. 6 that the opening 18 between head portions 20 and 22 is much wider at this point than in the heads final form (see FIG. 2). In other words, head portions 20 and 22 are spaced a predetermined distance (preferably at least about 1 mm) from each other. Further, through holes 40 are created during the molding step for receiving pivoting tufts 30 at a later point in the manufacturing process. Holes 40 will be described in greater detail below.

[0042] With reference to FIG. 7, after the toothbrush is removed from the mold, heat 42 is applied to the head near the neck and to part of the neck (hereinafter the neck). The heat can be applied in a number of ways including hot air, radiant heating, ultrasonic or convection (e.g. hot oil) heating. Here the heat is shown being applied to the sides of the neck. It is preferable to apply the heat to the top and bottom surface of the neck. The heat brings the plastic up to 1.0-1.1 times its glass transition temperature (when temperatures are measured in the Kelvin scale). The plastic should not be heated above 1.12 times its glass transition temperature in order to avoid damaging the plastic. More preferably, the plastic is heated to about 1.03-1.06 times its glass transition temperature (measured in degrees Kelvin). The glass transition temperature for polypropylene is about 100 degrees centigrade whereas the glass transition temperature for copolyester and polyurethane is about 65 degrees centigrade.

[0043] Pressure 44 is then applied to head portions 20, 22 to move the portions towards each other. Once head portions 20, 22 are in the position shown in FIG. 2, the heated portion of the head/neck is cooled by, for example, exposing the heated portion to a cold gas or liquid. If room temperature air is used to cool the neck, such air should be applied for about 20-25 seconds. This has the effect of forming the two head portions into their final positions.

[0044] In order to achieve short process times, the highest temperature heat source which will not damage the plastic should be used. If too hot a heat source is used and/or if the heat is applied for too long, the plastic can be damaged. If the heat source is not hot enough, the process will take too long and/or head portions 20, 22 will not remain in their final desired positions. If the head/neck are made of polypropylene and hot air is used to heat the neck, (a) the heated air should be at a temperature of about 170 degrees centigrade and should be applied to the neck for about 70 seconds, (b) the polypropylene should be raised to a temperature of about 140 degrees centigrade, and (c) a nozzle which applies the hot air to the neck should be about 10 mm from the neck.

[0045] If copolyester or polyurethane is used as the material for the head neck, (a) the heated air should be at a temperature of 250 degrees centigrade and should be applied to the neck for about 10 seconds, (b) the material should be raised to a temperature of preferably 95-100 degrees centigrade, and (c) a nozzle which applies the hot air to the neck should be about 15-20 mm from the neck.

[0046] Heating the respective materials above for the time indicated allows the material to be softened and mechanically bent into its final form. Exceeding the heating times above could cause the material to overheat and become damaged.

[0047] Turning to FIGS. 8 and 9, each pivoting tuft 30 has a multiplicity of bristles 46, a base support 48 and an anchor pivot 50. The bristles are secured to and extend from a first end 52 of the base support while a first end 54 of the anchor pivot extends from a second end 56 of the base support. The base support and anchor pivot are preferably a unitary structure made of the same material. Anchor pivot 50 includes a first portion 58 near the first end 54 and a second portion 60 near a second end 62 of the anchor pivot. First portion 58 is smaller in an X an Y dimension than second portion 60. Base support 48 is larger in an X and Y dimension than second portion 60 of the anchor support. Second portion 60 includes a pair of lips 63. The anchor pivot defines an opening 64 therethrough.

[0048] Tuft 30 can also be made by a hot-tufting type process as described above. Instead of injecting plastic into the mold to form a toothbrush handle, neck and head, the plastic is injected into a mold to form base support 48 and anchor pivot 50, capturing bristles 46 when the injected plastic cools.

[0049] With reference to FIGS. 10-12, through holes 40 (FIG. 6) will now be described. Each hole 40 extends from a top surface 66 of the brush head through a bottom surface 68. Hole 40 includes first and second portions 70 and 72. Portion 72 is substantially a parallelepiped except that some of its lower section is rounded off (see FIG. 11). Portion 70 is also substantially a parallelepiped except that two of its sides are flared to the sides by about 15 degrees (see FIG. 12). Hole portion 72 is longer in a dimension A than hole portion 70 (FIG. 11). Hole portion 70 has about the same width in a dimension B as hole portion 72 where hole portions 70 and 72 meet (FIG. 12). Dimensions A and B are substantially perpendicular to each other in this embodiment. A pair of lips 73 are defined by this arrangement.

[0050] Turning now to FIGS. 13-16, the insertion of pivoting tufts 30 into holes 40 will be described. A tuft 30 is positioned over a hole 40 with end 62 of anchor pivot 50 facing the hole (FIG. 13). As shown in FIGS. 16A-C, tuft 30 is moved towards hole 40 until end 62 starts to enter the hole (FIG. 16A). Tuft 30 is then pressed into the hole causing sides of hole portion 70 to squeeze second portion 60 of the anchor pivot. Accordingly, anchor pivot 50 collapses causing opening 64 to become temporarily smaller. Tuft 30 is then pushed all the way into hole 40 (FIG. 16C) at which point the resilient plastic anchor pivot springs back to its form shown in FIG. 16A. This paragraph describes a snap-fit retention of tuft 30 to the head.

[0051] Referring to FIG. 16C, base support 48 is longer in the A dimension than hole portion 70 and thus prevents tuft 30 from being pressed further into hole 40. Second portion 60 is also longer in the A dimension than hole portion 70 and so prevents tuft 30 from moving back out of hole 40. This is due to the fact that lips 63 (FIG. 8) engage lips 73 (FIG. 11). This arrangement also prevents tuft 30 from rotating about the long axis of the bristles.

[0052] As shown in FIG. 15, tuft 30 pivots when it is engaged by, for example, portions of the oral cavity during

brushing. Preferably each tuft **30** can pivot up to about 15 degrees to either side of a position perpendicular to surface **66**.

[0053] Turning to FIGS. 17 and 18, another type of tooth cleaning element in the form of a fin **80** is disclosed. Each fin is supported by a base support **48** and an anchor pivot **50** (both not shown) as described above, allowing the fin to pivot on the brush head. Alternatively, a fin can be securely affixed to the head so that it does not pivot. The fin is created of a thermoplastic elastomer (TPE) by an injection molding process. In this embodiment, a textured surface is provided by a series of ribs **82**. These ribs enhance cleaning of the oral cavity. The ribs are formed by injection molding a TPE over the fin. The ribs are preferably softer than the fin. Alternative textured surfaces (e.g. dimples) can be used in place of the ribs.

[0054] As shown in FIG. 18, the fin has a width of preferably about 0.030 inches. The long dimension of the fin above the base support is preferably 0.420 inches. A tip **84** of fin **80** has a width of preferably 0.007 inches. The distance from the base of the ribs to tip **84** is about 0.168 inches whereas the distance from the top of the ribs to the tip is about 0.079 inches. The top of the ribs have a width of about 0.035 inches. The ribs (textured surface) preferably extend about 2-12 mil away from said fin.

[0055] The invention has been described with reference to a preferred embodiment. However, it will be appreciated that variations and modifications can be effected by a person of ordinary skill in the art without departing from the scope of the invention.

1. A toothbrush head, comprising:

a tooth cleaning element extending from a top surface of the head, the head being divided into at least two portions which can be moved independent of each other, the tooth cleaning element being rotatable relative to that portion of the head from which it extends.

2. The toothbrush of claim 1, wherein the tooth cleaning element is a tuft of bristles.

3. The toothbrush of claim 1, wherein the tooth cleaning element is a fin made of a material selected from the group of materials consisting of plastic, rubber and combinations thereof.

4. The toothbrush of claim 1, wherein the tooth cleaning element has a range of rotation of up to about 30 degrees.

5. The toothbrush of claim 1, wherein the tooth cleaning element can rotate up to about 15 degrees to either side of a vertical position in which the element is perpendicular to a top surface of the portion of the head from which it extends.

6. The toothbrush of claim 1, further including one or more stationary tooth cleaning elements which substantially cannot be rotated.

7. The toothbrush of claim 1, wherein a portion of the head limits rotation of the tooth cleaning element.

8. The toothbrush of claim 1, wherein there is no portion of the toothbrush itself which rotates the tooth cleaning element.

9. The toothbrush of claim 1, wherein the tooth cleaning element is supported for rotation primarily about only one axis.

10. The toothbrush of claim 9, wherein the axis is substantially perpendicular to a long axis of the element.

11. The toothbrush of claim 1, wherein the tooth cleaning element is rotatable independent of any other tooth cleaning elements on the head.

12. The toothbrush of claim 1, wherein the two portions of the head define an opening in an interior portion of the head such that water can flow through this opening.

13. The toothbrush of claim 1, further comprising a second tooth cleaning element, wherein one of the two tooth cleaning elements is located on one of the two head portions, and the other of the two tooth cleaning elements is located on the other of the two head portions.

14. The toothbrush of claim 13, wherein both of the tooth cleaning elements are located on the same head portion.

15. The toothbrush of claim 1, wherein each head portion includes alternating projections and recesses, the projections of each head portion fitting at least partially into the recesses of the other head portion.

16. The toothbrush of claim 15, wherein one of the projections on one of the head portions has at least one tuft extending therefrom and is surrounded on three sides by the other head portion.

17. A tooth cleaning element, comprising:

one or more tooth cleaners;

a base support; and

an anchor pivot, one end of the one or more tooth cleaners being secured to a first end of the base support, and a first end of the anchor pivot extending from a second end of the base support, a first portion of the anchor pivot near the anchor pivot's first end being smaller than a second portion of the anchor pivot located near a second end of the anchor pivot.

18. The tooth cleaning element of claim 17, wherein the one or more tooth cleaners are one or more bristles.

19. The tooth cleaning element of claim 17, wherein the anchor pivot has an opening therethrough, such that when the anchor pivot is pressed into an entrance to a hole in the head of a toothbrush, the entrance being smaller than the second portion of the anchor portion, the opening temporarily gets smaller to allow the second portion of the anchor pivot to flex and pass through the hole entrance.

20. The toothbrush of claim 17, wherein the one or more tooth cleaners are made of polybutylene terephthalate.

21. The toothbrush of claim 17, wherein the base support and anchor pivot are a unitary structure.

22. The toothbrush of claim 1, wherein the tooth cleaning element includes one or more tooth cleaners;

a base support; and

an anchor pivot, one end of the one or more tooth cleaners being secured to a first end of the base support, and one end of the anchor pivot being secured to a second end of the base support.

23. The toothbrush of claim 22, wherein the anchor pivot has a larger section further from the base support than a smaller section of the anchor portion, the larger section and smaller section each having a length which is longer than a width.

24. The toothbrush of claim 22, wherein the anchor pivot is located in a hole which passes all the way through the head.

25. The toothbrush of claim 24, wherein the base support is located outside the hole.

26. The toothbrush of claim 24, wherein a first portion of the hole near a bottom surface of the head opposite the top surface of the head has about the same length and width as the length and width of the larger section of the anchor pivot, the larger section of the anchor pivot residing in the first hole portion.

27. The toothbrush of claim 26, wherein the hole has a second portion near the top surface of the head, the second hole portion having a length which is shorter than a length of the first hole portion.

28. The toothbrush of claim 27, the second hole portion having a width which is about the same as the width of the first hole portion where the two hole portions meet, the width of the second hole portion flaring from where the hole portions meet towards the top surface of the head.

29. The toothbrush of claim 27, wherein the tooth cleaning element rotates about an axis which is substantially parallel to the width of the second hole portion.

30. A method of making a toothbrush head, comprising the steps of:

molding a plastic toothbrush head in a mold, the head having two distinct portions which are spaced a predetermined distance from each other;

removing the head from the mold;

moving the two head portions towards each other;

heating at least that part of the head where the two head portions connect;

cooling at least that part of the head where the two head portions connect such that the two head portions will now remain in positions where they will be spaced apart a distance which is less than the predetermined distance, wherein the molding step is effective to secure a tooth cleaning element to one of the two head portions.

31. The method of claim 30, wherein the tooth cleaning element is a tuft of one or more bristles.

32. The method of claim 30, wherein the molding step is effective to secure at least one or more tooth cleaning elements to each of the two head portions.

33. The method of claim 30, wherein the molding step is effective to mold a hole into one of the two head portions, the hole extending all the way through the head portion.

34. The method of claim 33, further comprising the step of:

inserting a tooth cleaning element into the hole.

35. A method of making a toothbrush head, comprising the steps of:

molding a plastic toothbrush head in a mold, the head having at least one hole therein which extends all the way through the head;

removing the head from the mold; and

inserting a tooth cleaning element into the hole.

36. The method of claim 35, wherein the hole extends from a top surface of the head from which one or more tooth cleaning elements will project, to a bottom surface of the head opposite the top surface.

37. The method of claim 36, wherein the hole has a first portion near the top surface, and wherein the hole has a second portion near the bottom surface, the second hole

portion's length being longer than its width, the length of the first hole portion being shorter than the length of the second hole portion.

38. The method of claim 35, further comprising the step of:

providing a tooth cleaning element having one or more tooth cleaners, a base support and an anchor pivot, one end of the one or more tooth cleaners being secured to a first end of the base support, and one end of the anchor pivot being secured to a second end of the base support, the anchor pivot having a larger section further from the base support than a smaller section of the anchor pivot, the larger section having a length which is longer than its width.

39. The method of claim 38, further comprising the steps of:

positioning the anchor support adjacent the first hole portion such that the length of the first hole portion is substantially parallel to the width of the larger section of the anchor pivot; and

inserting the anchor pivot into the hole such that the anchor pivot resides in the second hole portion and the base support is adjacent to the top surface.

40. The toothbrush of claim 1, wherein the tooth cleaning element is snap-fit to the head.

42. A toothbrush, comprising:

a head; and

a pair of tufts extending from an end of the head furthest from a handle from which the head extends, both tufts tilting away from the handle, wherein each tuft has a larger cross-section than any other tuft on the head.

43. The toothbrush of claim 42, wherein the tufts are tilted by about 12 degrees.

44. A toothbrush, comprising:

a head; and

a pair of tufts extending from said head, a first one of the tufts being closer to a neck from which the head extends than a second one of the tufts, a base of the first tuft being closer to a first side of the head, the first tuft being tilted towards a second side of the head, a base of the second tuft being closer to the second side of the head, the second tuft being tilted towards the first side of the head, each tuft having an oval cross-section.

45. The toothbrush of claim 44, wherein a long dimension of the oval cross-section for each tuft is oriented towards the direction of tilt.

46. The toothbrush of claim 44 wherein the bristles are crimped.

47. The toothbrush of claim 44 wherein the bristles are notched.

48. A tooth cleaning element, comprising:

a fin; and

a textured surface provided on the fin.

49. The tooth cleaning element of claim 48, wherein said textured surface includes ribs.

50. The tooth cleaning element of claim 48, wherein said textured surface includes dimples.

51. The tooth cleaning element of claim 49, wherein said textured surface extends from about 2-12 mil away from said fin.

52. The method of claim 30, wherein said heating step is effective to heat the head part to about 1.00-1.12 times the plastic's glass transition temperature.

53. The method of claim 30, wherein said heating step is effective to heat the head part to about 1.03-1.06 times the plastic's glass transition temperature.

54. The method of claim 30, wherein said cooling step is accomplished by blowing air onto the head part for 20-25 seconds.

55. The method of claim 30, wherein said molding step is effective to mold a split between the two distinct head portions.

56. The method of claim 55, wherein an end of said split near the part of the head that is heated has a circular shape when viewed from a top of the head.

57. The toothbrush of claim 1, wherein the tooth cleaning element can rotate up to about 8 degrees to either side of a vertical position in which the element is perpendicular to a top surface of the portion of the head from which it extends.

* * * * *



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(76) Inventors: **Phillip M. Braun**, Exeter, RI (US);
William R. Brown JR., Peabody, MA
(US); **Alexander T. Chenvainu**,
Sudbury, MA (US); **Thomas A.**
Christman, Lexington, MA (US)

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Correspondence Address:
FISH & RICHARDSON PC
225 FRANKLIN ST
BOSTON, MA 02110 (US)

(21) Appl. No.: **10/364,148**(22) Filed: **Feb. 11, 2003**(57) **ABSTRACT**

Toothbrush heads, e.g., for power toothbrushes, are provided. The toothbrush heads include a support member, a resilient member extending from the support member, and a plurality of tufts of bristles extending from the support member and at least partially surrounding the member. The resilient member may be cup-shaped, fan-shaped, or textured.

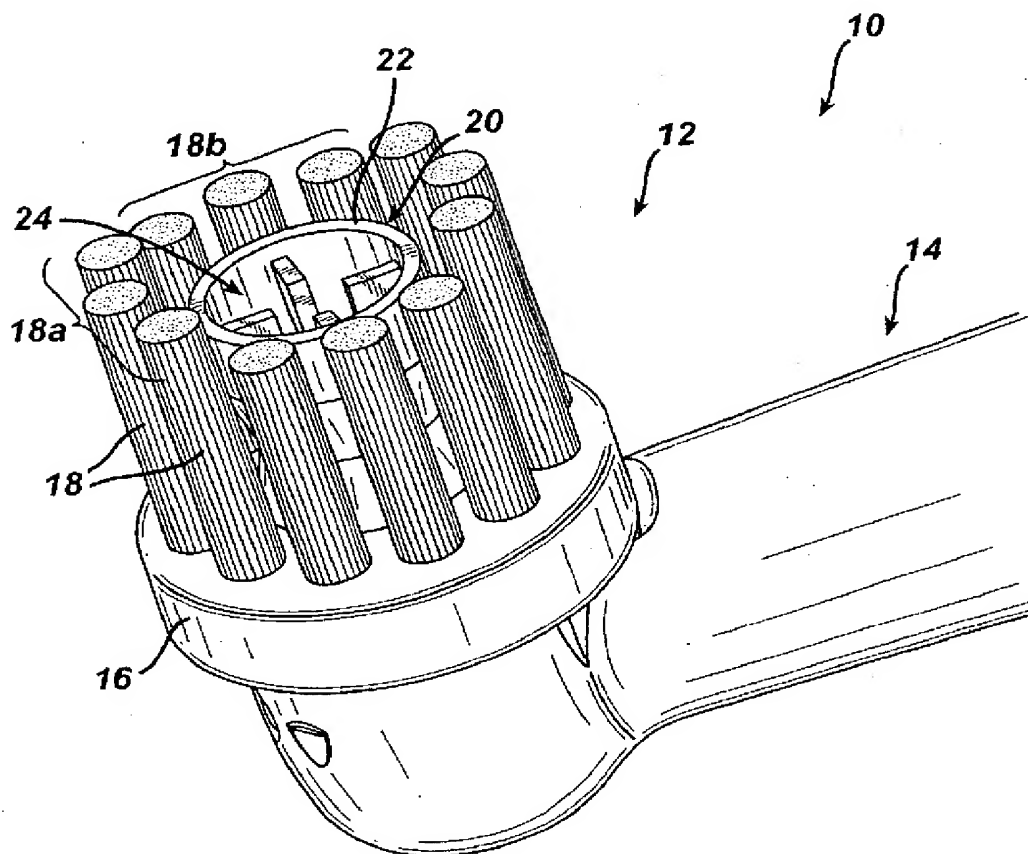


FIG. 1

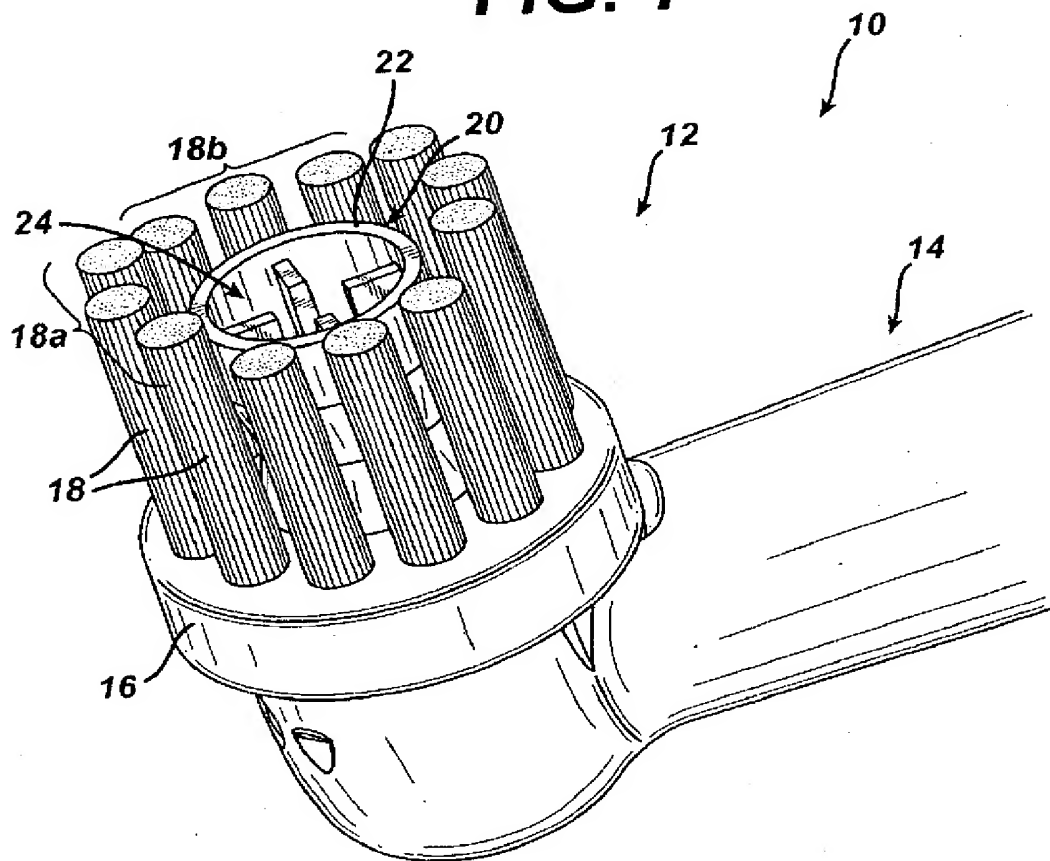


FIG. 1A

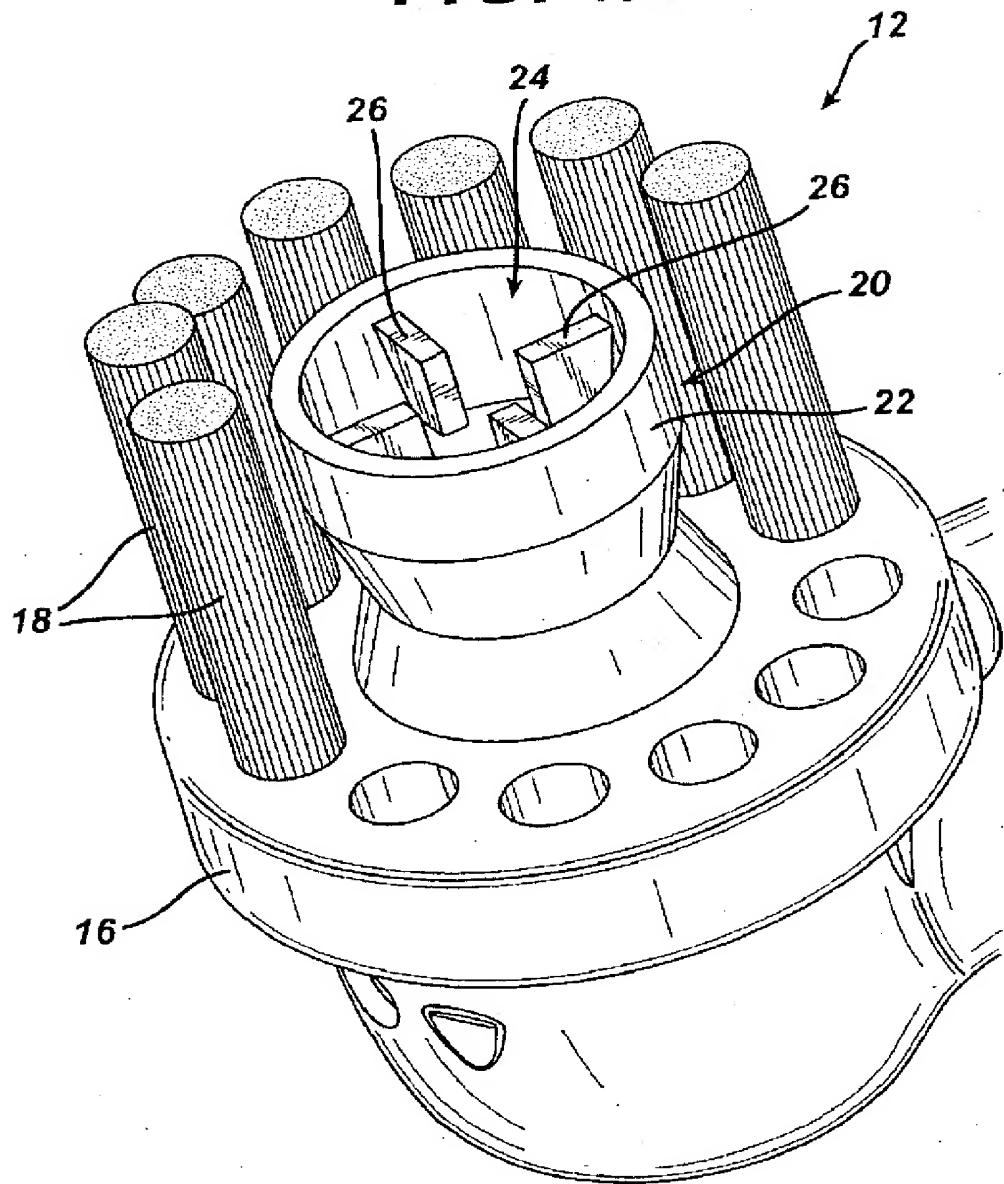


FIG. 1B

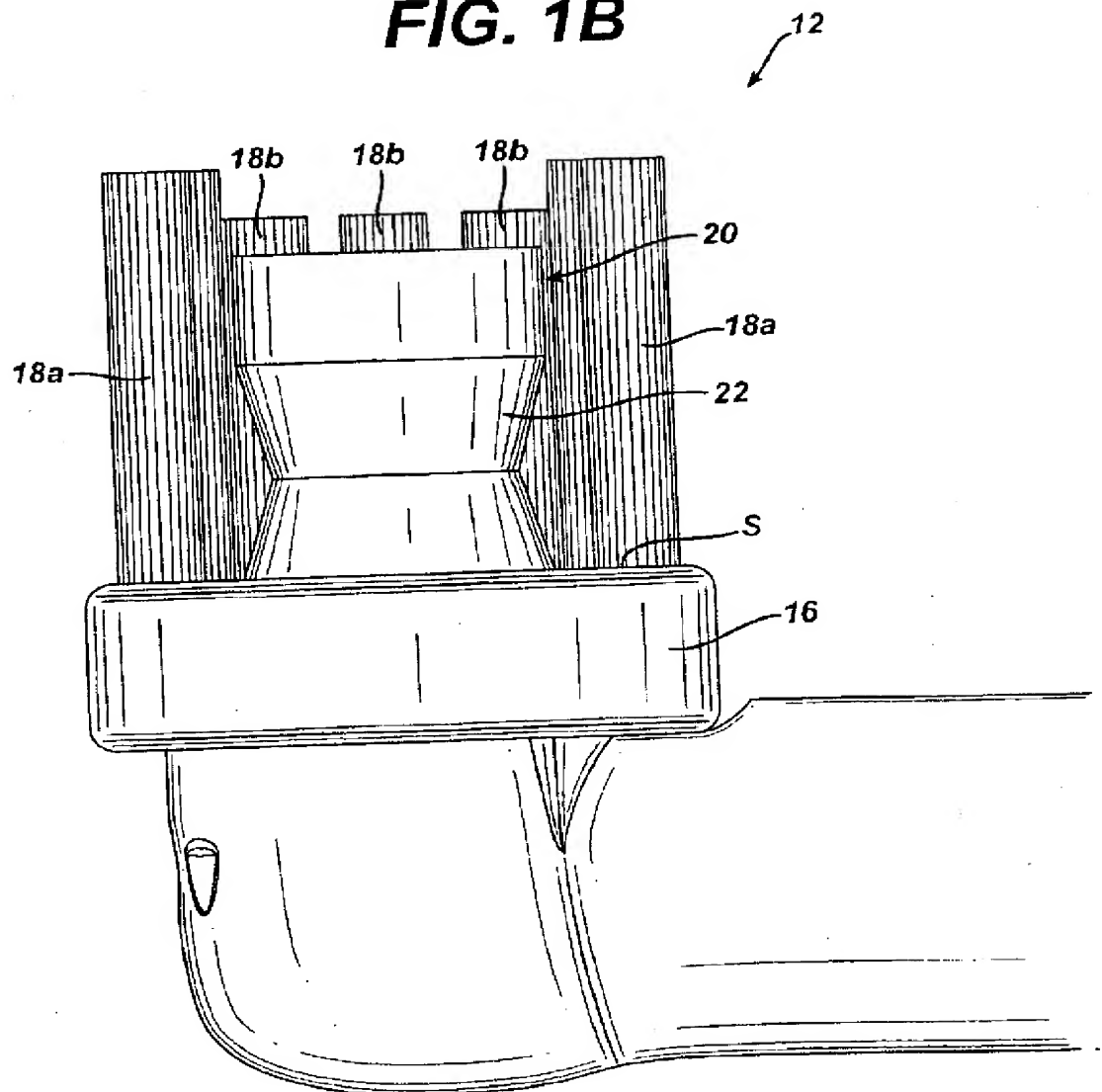


FIG. 2

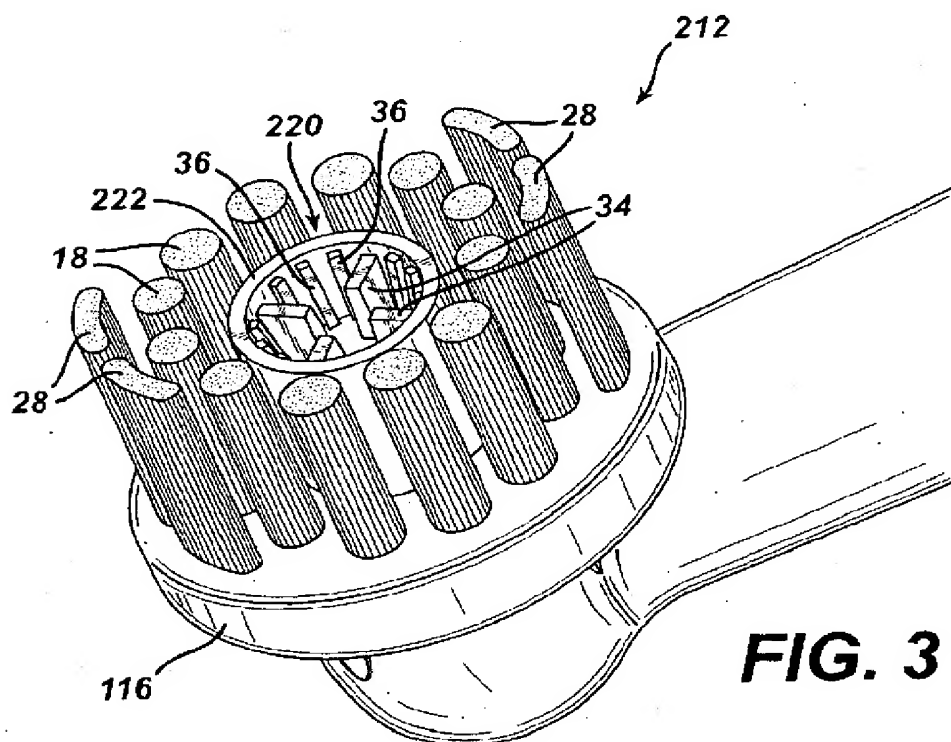
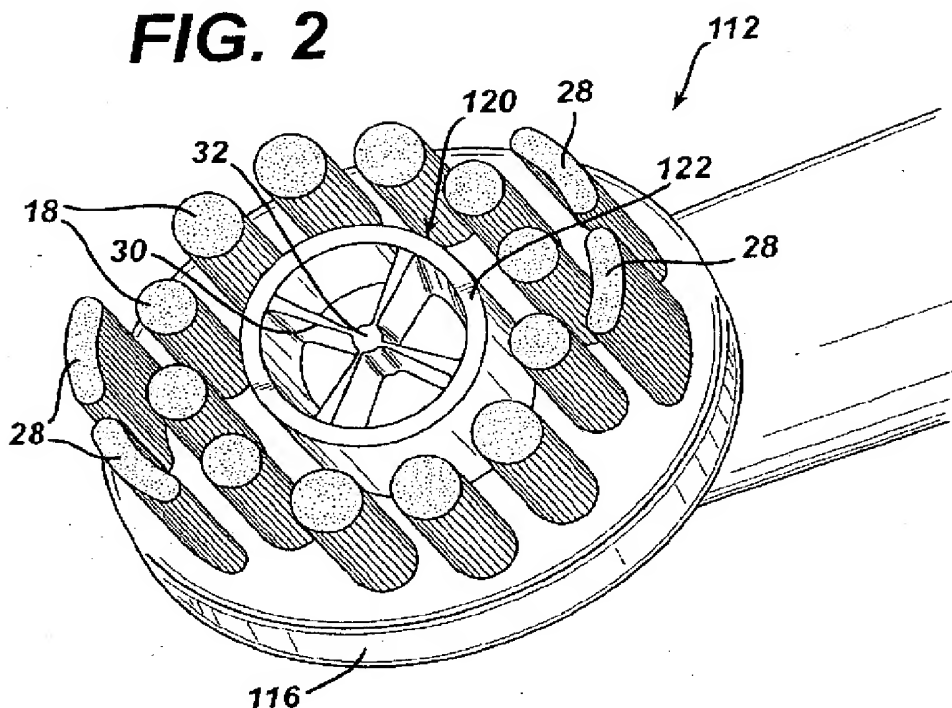


FIG. 3

FIG. 2A

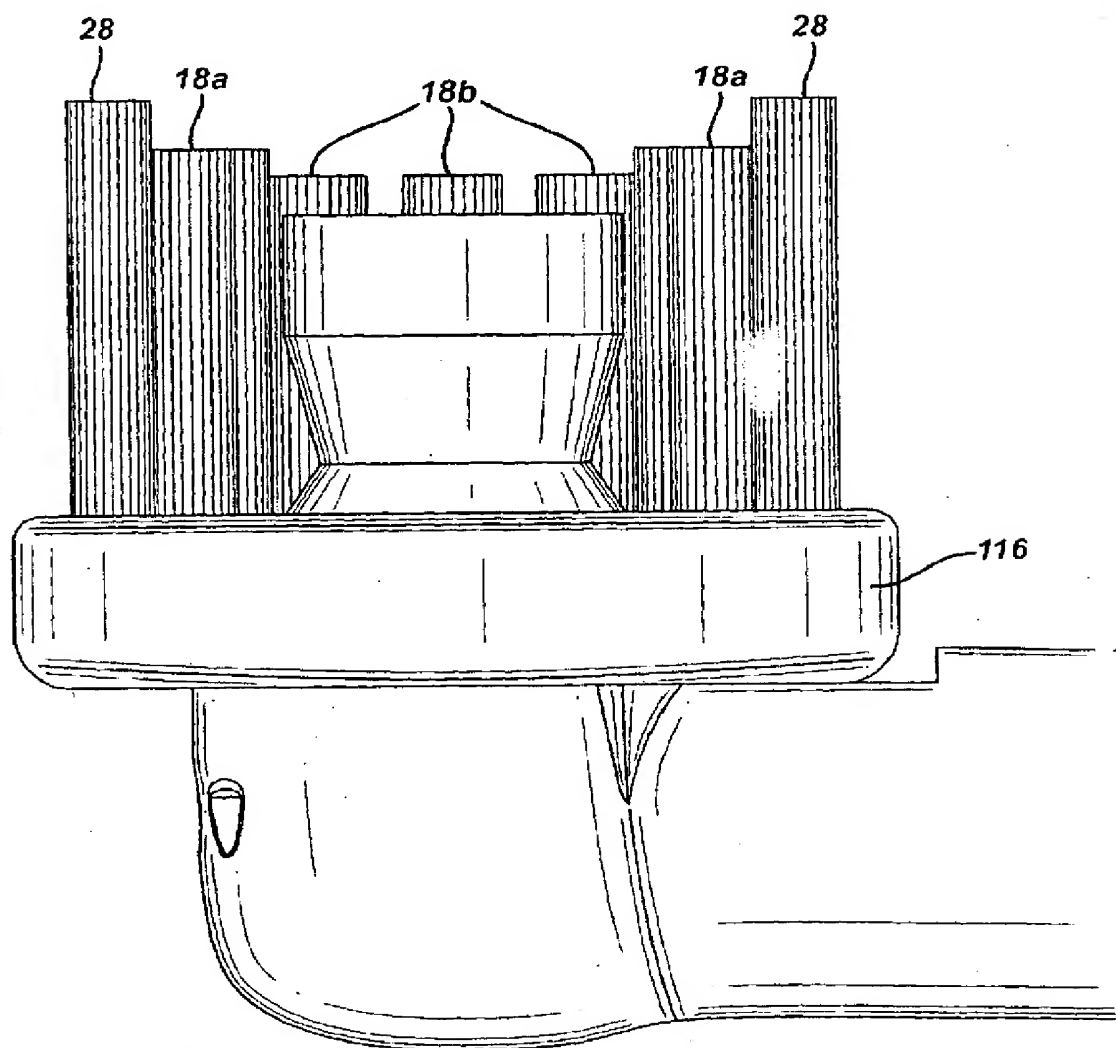
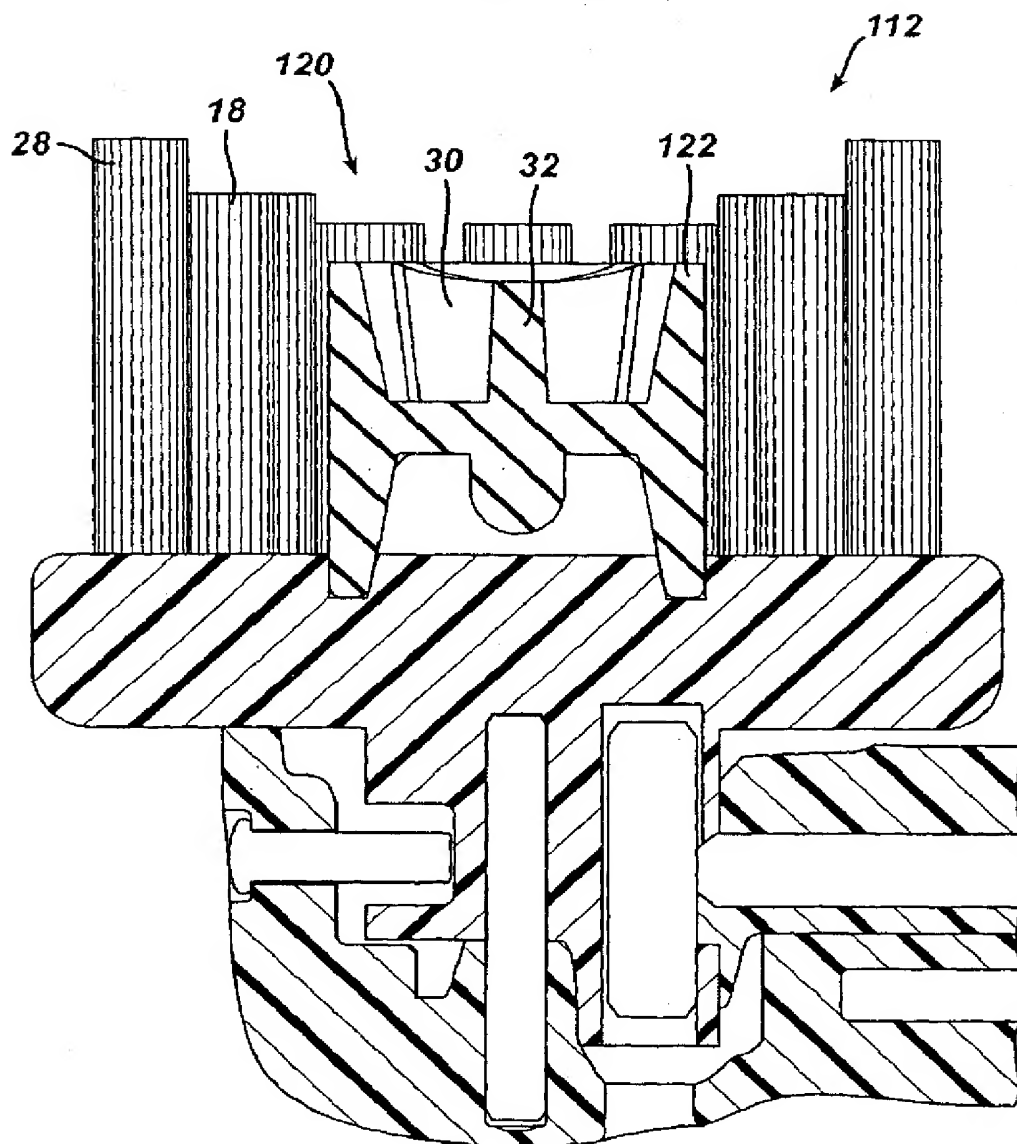


FIG. 2B



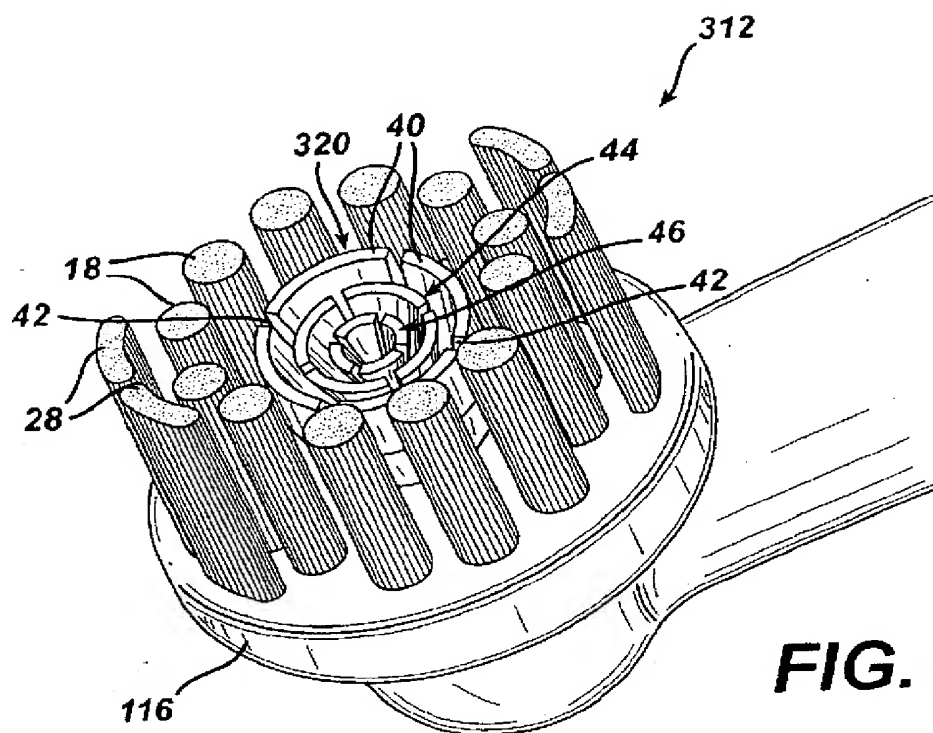


FIG. 4

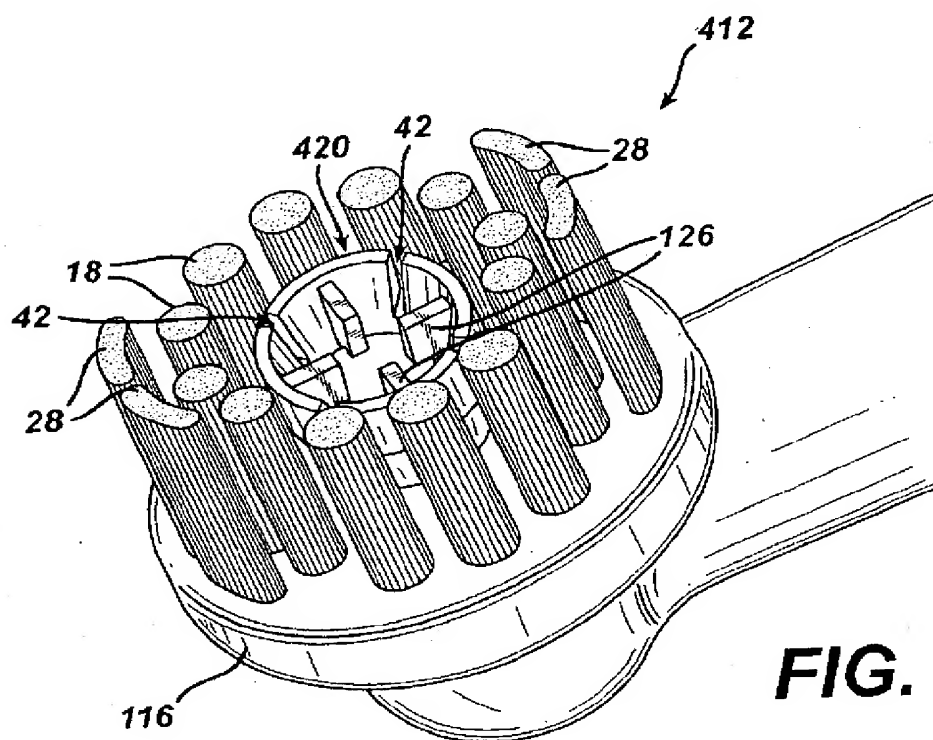
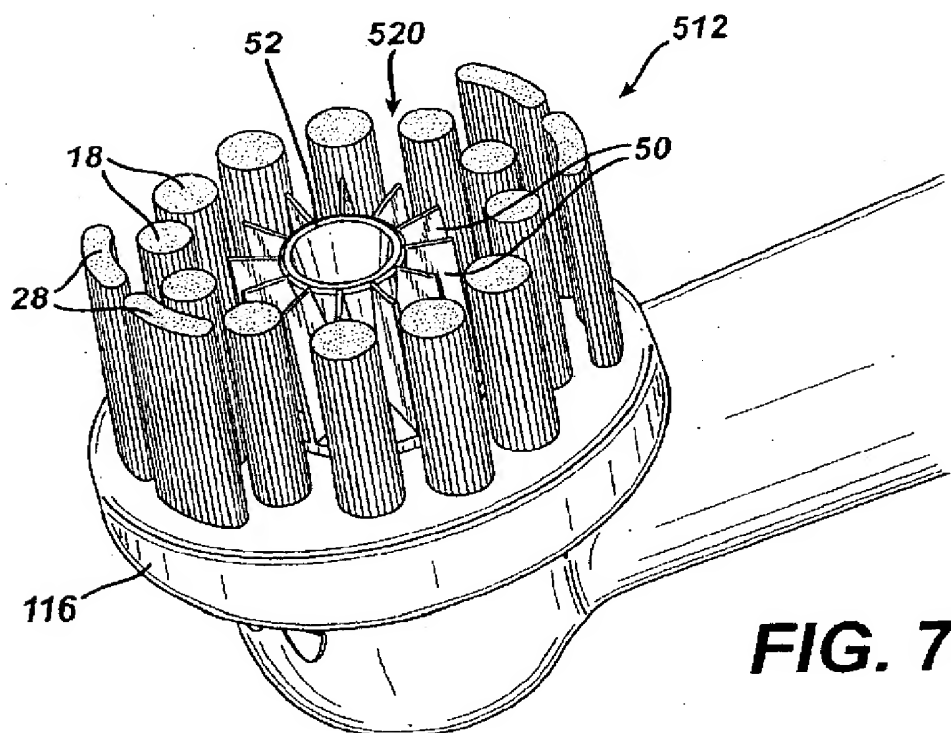
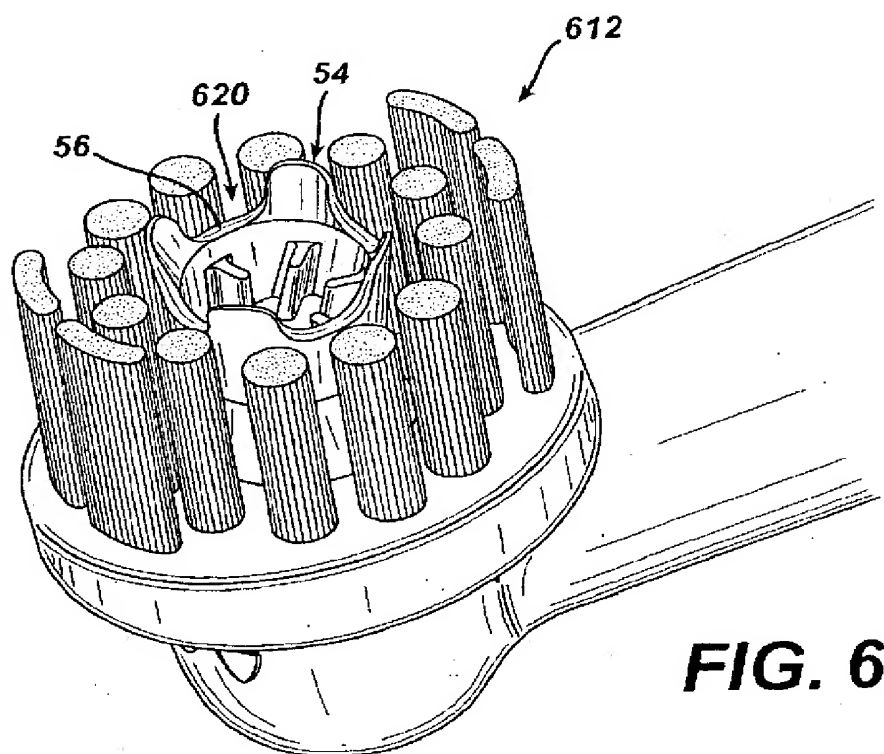


FIG. 5



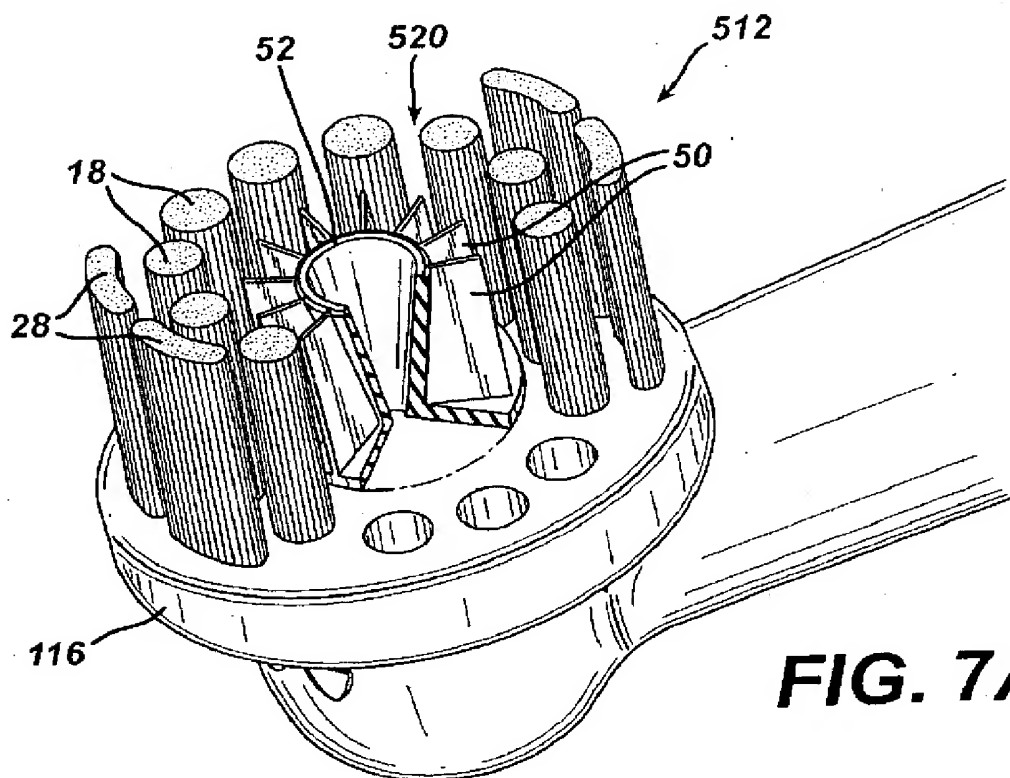
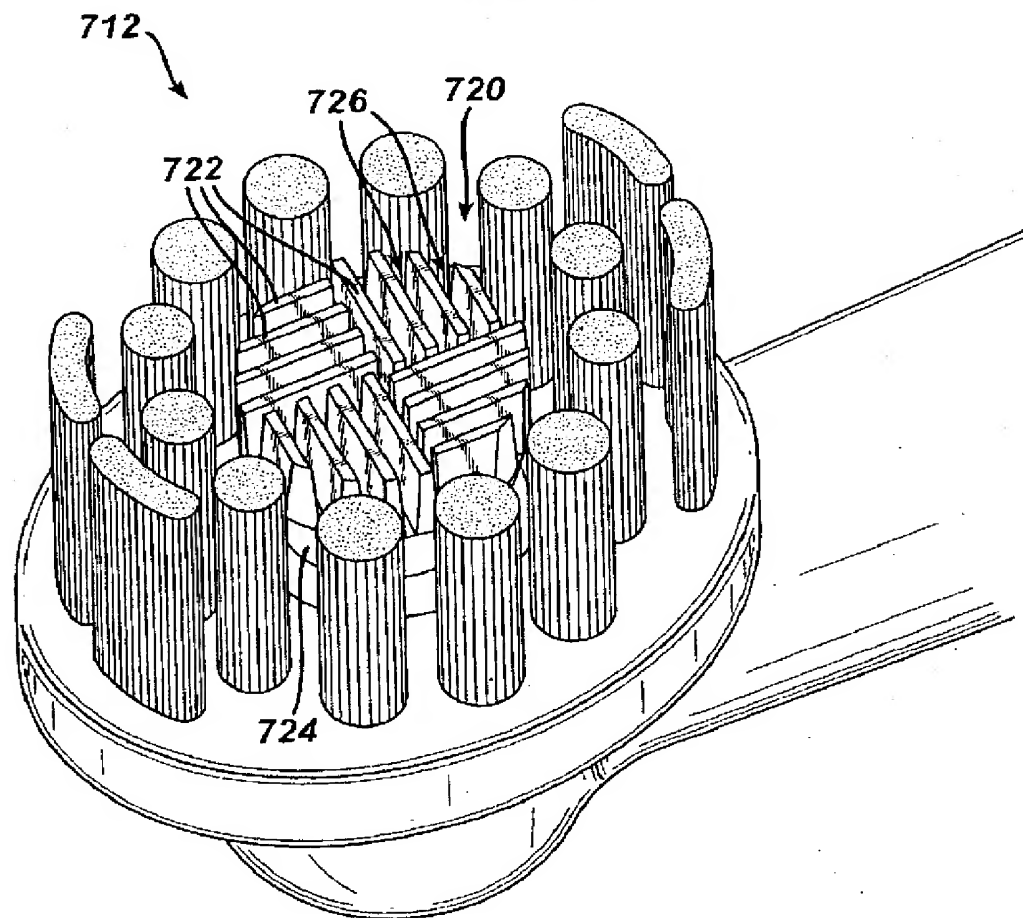


FIG. 8



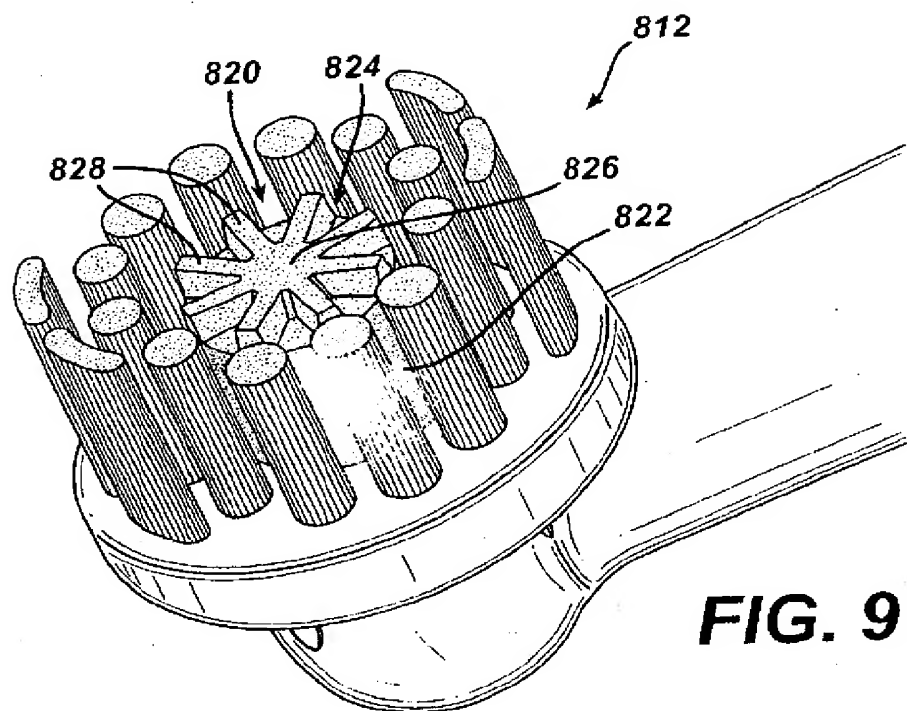


FIG. 9

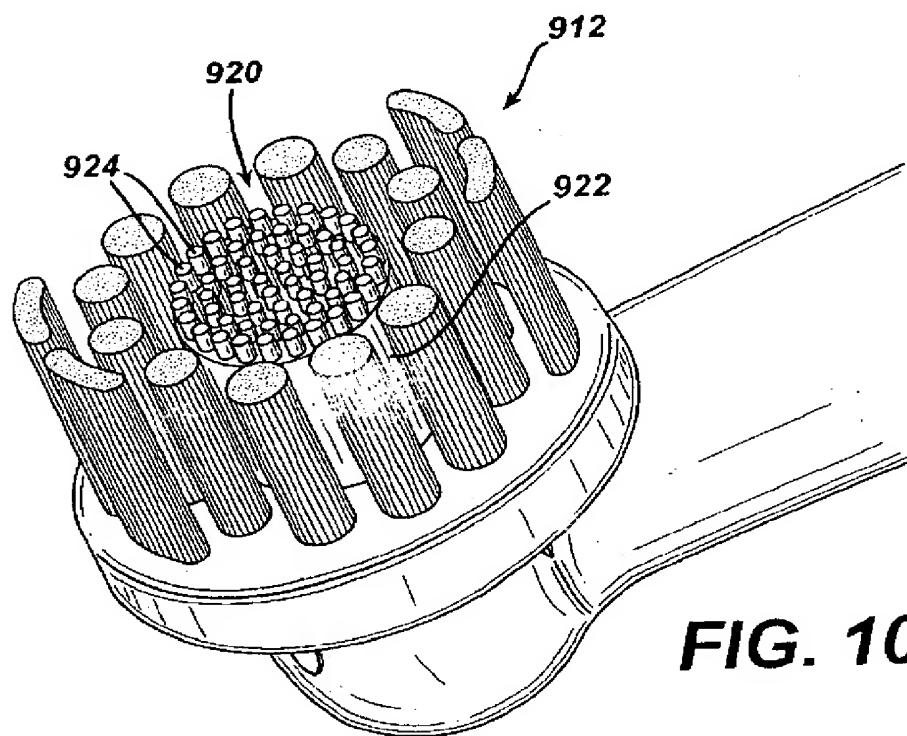


FIG. 10

TOOTHBRUSHES

TECHNICAL FIELD

[0001] This invention relates to toothbrushes, and more particularly to power toothbrushes.

BACKGROUND

[0002] Power toothbrushes are well known and have been on the market for years. In typical power toothbrushes, tufts of bristles on the brush head extend generally perpendicularly from the top surface of the head. The head is oscillated, rotated and/or translated in order to provide enhanced tooth cleaning capability.

SUMMARY

[0003] In one aspect, the invention features a toothbrush head that includes a support member, a resilient member extending from the support member, and a plurality of bristles or tufts of bristles extending from the support member and at least partially surrounding the resilient member. By "resilient member" we mean a unitary structure formed of a resilient material such as an elastomer or foam, the resilient member having a perimeter, when the resilient member is viewed from above (e.g., looking down the long axis of the bristles, if the bristles and resilient member are disposed perpendicular to the support member), which circumscribes an area greater than the surface area of the resilient member that will initially contact the teeth of a user of the toothbrush. By "initially contact the teeth," we mean the surface area that will contact the teeth and/or gums prior to any significant deformation of the resilient member resulting from the application of pressure against the teeth, i.e., the area that would contact the teeth if the toothbrush were lightly touched to the teeth with the power turned off. By "unitary structure," we mean that, if the resilient member includes a plurality of elements, such as fins, protrusions or lamellae, the elements are integrally joined to form a single structure that is mounted on the separate support member.

[0004] In one aspect, the resilient member may be cup-shaped.

[0005] The term "cup-shaped," as used herein, refers to a shape that is generally elliptical, oval, ovoid, or circular in cross-section and that defines a central open area. The walls of the cup-shaped member may be continuous or discontinuous and may define a cylinder, cone, frustoconical shape, or other desired shape. The bottom of the central open area may be flat, concave, or any other desired shape.

[0006] In another aspect, the resilient member may be fan-shaped.

[0007] The term "fan-shaped," as used herein, refers to a shape that is generally comprised of a central hub region and at least two protrusions, e.g., ribs, fins, or other types of protrusions, that extend substantially radially from the central hub region. The protrusions may form a helix, spiral, screw, or other pattern. The central hub region may be solid, hollow, or cup-shaped, and may be, for example, generally elliptical, oval, ovoid, or circular in cross-section.

[0008] In a third aspect, the resilient member is "textured."

[0009] The term "textured," as used herein, refers to a structure that has a macroscopic surface texture. For

example, the textured member may be composed of a cluster of ribs, fins, columns, or other protrusions, or a combination of ribs, fins, columns, or other protrusions, that together form a unitary structure. As other examples, the texture can be imparted to the member by a manufacturing process such as injection molding, by embedding particles in the surface of the member, or by selecting a material for the member that inherently has a surface texture, e.g., an open cell foam.

[0010] Some implementations include one or more of the following features.

[0011] The toothbrush head is configured for use on a power toothbrush. The cup-shaped, fan-shaped or textured member comprises a resilient material.

[0012] The cup-shaped member defines an open central area having a depth of from about 2 to 5 mm. The cup-shaped member includes a side wall that is substantially continuous. The cup-shaped member includes a plurality of segments that define a discontinuous side wall. The cup-shaped member includes a generally cylindrical, conical or frustoconical side wall.

[0013] The toothbrush head further includes a plurality of fin members extending inwardly from an inner surface of the cup-shaped member. The fins have different lengths, heights, and/or thicknesses. At least some of the fin members converge to intersect at a central hub. The central hub has a shape selected from the group consisting of cones, inverted cones, cups and cylinders. The converging fin members increase in height with increasing radial distance from the central hub. The cup-shaped member includes a wavy edge.

[0014] The toothbrush head further includes one or more inner cup-shaped members disposed concentrically within an open area defined by the cup-shaped member. The cup-shaped member and inner cup-shaped members are comprised of segments that define discontinuous outer walls of the cup-shaped members.

[0015] At least some of the tufts have different heights. The height of the bristle tufts is greater than the height of the cup-shaped member.

[0016] The fan-shaped member includes a plurality of protrusions extending radially from a central hub. The central hub is generally cylindrical or conical.

[0017] The textured member includes a plurality of lamellae extending from a common base. The textured member includes a molded element having an integrally molded surface texture. The textured member comprises a resilient member formed of a material having a macroscopic surface texture.

[0018] The invention also features methods of using and making the toothbrush heads described above.

[0019] In some implementations, the toothbrush head provides gum massaging and stimulation in addition to cleaning. The cup-shaped member may help position the toothbrush head on each individual tooth during brushing. This positioning of the head may in turn assist the user in obtaining a proper tooth-to-tooth brushing technique, rather than using a scrubbing motion. This seating action also helps to position the bristles surrounding the cup-shaped member to more effectively access areas between the teeth and along the gumline. In addition, the cup-shaped member may help

hold the toothpaste against the teeth during brushing. As a result, toothbrushing may be less messy, and the toothbrush head may be able to hold more toothpaste. Also, toothpaste may tend to be concentrated against the tooth surface, which may in turn result in improved whitening, stain removal, and cleaning. The cup-shaped member may also enhance plaque removal. In some embodiments, the cup-shaped member may be designed to enhance the foaming action of toothpaste.

[0020] In other implementations, the toothbrush head may provide enhanced surface cleaning by the motion of the fan-shaped or textured member, both of which provide a wiping action. The increased contact area of the member with the surface of the tooth may also provide enhanced whitening and stain removal.

[0021] Other features and advantages of the invention will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

[0022] FIG. 1 is a perspective view of a portion of a power toothbrush, according to a first embodiment of the invention.

[0023] FIG. 1A is similar to FIG. 1, with the front tuft bristles removed to show the detail of the cup-shaped member.

[0024] FIG. 1B is a side view of FIG. 1A.

[0025] FIG. 2 is a perspective view of a toothbrush head according to an alternative embodiment of the invention. FIG. 2A is a side view of a toothbrush head similar to the one shown in FIG. 2 with the front tufts of bristles removed to show the detail of the cup-shaped member. FIG. 2B is a cross-sectional view of the toothbrush head shown in FIG. 2, taken along the long axis of the toothbrush.

[0026] FIGS. 3-10 are perspective views of toothbrush heads according to various alternative embodiments of the invention, with the exception of FIG. 7A, which shows the toothbrush head shown in FIG. 7 with the front tufts of bristles removed to show the detail of the fan-shaped member.

DETAILED DESCRIPTION

[0027] Referring to FIG. 1, a power toothbrush 10 includes a head 12 and a neck 14. As is well known to those skilled in the art, head 12 is oscillated during brushing. An electric motor (not shown) oscillates the head through gearing, linkages, cranks, and/or other drive mechanisms as is well known. Electrical power may be supplied to the motor by rechargeable or single use (disposable) batteries. Further details as to how the head is oscillated will not be provided, as this aspect of the brush is not the focus of the invention.

[0028] Head 12 includes a generally circular support member 16, and, extending from the support member 16, a plurality of bristle tufts 18. Although each tuft is shown as a solid mass in the drawings, the tufts are actually each made up of a great mass of individual plastic bristles. The bristles may be made of any desired polymer, e.g., nylon 6.12 or 6.10, and may have any desired diameter, e.g., 4-8 mil. The tufts are supported at their bases by the support member, and may be held in place by any desired tufting technique as is

well known in the art, e.g., hot tufting or a stapling process. The tufts may also be mounted to move on the support member, as is well known in the toothbrush art.

[0029] Head 12 further includes a cup-shaped member 20, which can be seen clearly in FIG. 1A, in which some of the bristle tufts have been omitted. Cup-shaped member 20 includes a side wall 22 that defines a central open area 24. Generally, the central open area 24 has a depth of from about 2 to 5 mm, measured from the highest point of the rim of the cup-shaped member to the lowest point of the central open area. Cup-shaped member 20 also includes a plurality of ribs 26 that extend inwardly into the open area 24. The cup-shaped member 20 is preferably formed of a resilient material such as an elastomer, e.g., a thermoplastic elastomer. The material hardness for such structures may range from 10 to 70 Shore A, with the preferred hardness selection depending on the design and dimensions of the cup-shaped member.

[0030] The cup-shaped member 20 may be fixedly mounted on the toothbrush head, or may be rotatably mounted, so that the cup-shaped member 20 can spin about its long axis while the toothbrush head is oscillated. The spinning motion may be driven by the same motor that oscillates the head, as would be understood by those skilled in the art. If the cup-shaped member is fixedly mounted, it may be mounted by any conventional technique, e.g., by screwing it in place or over-molding it onto the support member.

[0031] As shown in FIG. 1B, the height of bristle tufts 18 above the top surface of support member 16 will generally be greater than the height of the cup-shaped member 20 from surface S. This height differential allows the head to contour around each tooth, enhancing the tooth-to-tooth indexing effect mentioned above.

[0032] There is also a height differential between the different bristle tufts. The end bristle tufts 18A, i.e., the tufts that are adjacent the long axis of the toothbrush neck 14 when the head 12 is at rest, are taller than the side tufts 18B. For example, the height of the cup-shaped member may be from about 5.5 to 10 mm, with the end tufts 18A being about 20 to 30% taller than the cup-shaped member, e.g., from about 6.6 to 13 mm in height, and the side tufts 18B being about 5 to 15% taller than the cup-shaped member, e.g., about 5.8 to 11.5 mm in height. Making the side tufts shorter than the end tufts allows the longer tufts to reach in between the teeth, while the shorter tufts clean along the gumline.

[0033] Toothbrush heads according to other embodiments are shown in FIGS. 2-10. In each of these embodiments, the support members 116 are generally elliptical, rather than circular as shown in FIG. 1. The elliptical shape provides more room for additional bristle tufts and thus these toothbrush heads further include curved elongated interdental tufts 28. In these embodiments, the cup-shaped member and bristle tufts are generally shorter than in the embodiment discussed above. In an elliptical head, the reduced height will tend to make the brush more comfortable and less "bulky" feeling in a user's mouth. As in the embodiment discussed above, the bristle tufts are generally taller than the cup-shaped member. As shown in FIG. 2A, the interdental tufts 28 are also taller than the cup-shaped member, e.g., by about 30 to 40%.

[0034] Each of the embodiments shown in FIGS. 2-7 includes a different type of cup-shaped member.

[0035] In head 112, shown in FIG. 2, cup shaped member 120 includes a side wall 122, and extending inwardly from the side wall, a plurality of ribs 30 that converge at a generally cylindrical central hub 32. In alternate embodiments (not shown) the central hub may be conical or cup-shaped. In this design, as shown in FIG. 2B, the ribs are at the same height as the cup at the outer perimeter, and decrease in height as they approach the center. This arrangement allows the ribs to act as "squeegees" to clean the tooth surface. The addition of the central hub adds strength to the total structure and the ribs. If this additional strength is not required for a particular design, the central hub may be omitted, and the ribs may simply intersect each other, or may stop short of intersecting. In head 212, shown in FIG. 3, cup-shaped member 220 includes a side wall 222 and, extending inwardly from the side wall, a plurality of larger ribs 34 and smaller ribs 36. The larger ribs are longer (i.e., extend further into the center), and may have a different thickness and/or height than the smaller ribs.

[0036] In the embodiments shown in FIGS. 4 and 5, the cup-shaped member is segmented, i.e., it has a discontinuous side wall that includes a plurality of arcuate segments. The segmented structure imparts flexibility to the cup-shaped member, and may allow the cup-shaped member to conform better to the tooth surface. As can be seen in FIG. 5, in these embodiments the segments are defined by grooves 42 that do not extend to the bottom of the cup-shaped member. As a result, the segments are connected to form a unitary structure.

[0037] In head 312, shown in FIG. 4, cup-shaped member 320 includes a segmented side wall that includes four arcuate segments 40 having grooves 42 therebetween. Within the open center area defined by the cup-shaped member 320 are disposed two concentrically arranged smaller inner cup-shaped members 44 and 46. These inner cup-shaped members have the same segmented structure as the outer cup-shaped member 320. The concentric members provide a large surface area for contact with the tooth surface, which may provide improved cleaning.

[0038] In head 412, shown in FIG. 5, cup-shaped member 420 again includes a segmented side wall comprised of four arcuate segments. In this embodiment, ribs 126 extend inwardly from the side wall, as in the embodiment shown in FIG. 1.

[0039] In the embodiment shown in FIG. 6, head 612 includes a cup-shaped member 620 that has a wavy fringe 54 extending above its upper edge 56. The wavy fringe is relatively soft and flexible, so that it will lay flat when pressed against the surface of the teeth. This may allow the fringe to slide under the gums and between the teeth, providing plaque removal and gum stimulation which may reduce gingivitis. Generally, the fringe has a thickness of about 0.15 to 0.25 mm, measured at its top edge, and about 0.4 to 0.8 mm measured at its base (where the fringe joins the rim of the cup-shaped member). While four relatively large waves are shown in FIG. 6, if desired more waves and/or smaller waves may be used. The number and size of the waves are selected to provide desired product attributes.

[0040] Head 612 also differs from the designs described above in that the cup-shaped member 620 includes ribs 60 that are inclined with respect to the longitudinal axis of the cup-shaped member.

[0041] In the embodiment shown in FIG. 7, head 512 includes a fan-shaped member 520 that has a plurality of ribs 50 extending radially from an outer surface of its side wall 52 in a fan-like arrangement. In this embodiment, the side wall 52 is generally conical. Alternatively, if desired, the side wall may be cylindrical (not shown). In this embodiment, the fan-like structure of the cup-shaped member may enhance the foaming action of some toothpastes. The ribs may also act as "squeegees", enhancing tooth-cleaning action.

[0042] In the embodiment shown in FIG. 8, head 712 includes a textured member 720 that is comprised of a plurality of lamellae 722 that extend from a common base 724 together define a unitary structure. The lamellae 722 are arranged in different directions to give a "textured" feel. In this embodiment, the lamellae define a generally circular member, and are arranged in groups that are at right angles to each other in a "woven" pattern. However, the textured member may have any desired shape and arrangement of lamellae. It is generally preferred that the lamellae be relatively closely spaced, e.g., that spaces 726 be less than about 0.75 mm wide, more preferably about 0.5 mm or less.

[0043] In the embodiment shown in FIG. 9, head 812 includes a textured member 820. Textured member 820 includes a generally cylindrical base 822 and, extending from the base, a contact portion 824 that includes a central hub 826 and a plurality of ribs 828 extending radially from the hub. Textured member 820 may be formed of a foam, as shown, to provide a surface texture.

[0044] In the embodiment shown in FIG. 10, head 912 includes a textured member 920, including a generally cylindrical base 922 and, extending from the base, a plurality of small nubs 924 that provide the member with a textured feel.

[0045] A textured feel may be provided in many ways, for example by forming a resilient member of any desired shape of a material having a macroscopic surface texture, e.g., an open celled foam, or a material having texture-imparting particles embedded in its surface.

[0046] Other embodiments are within the scope of the following claims.

[0047] For example, while the cup-shaped member is shown in the drawings as centrally-located on the toothbrush head, if desired it may be positioned off-center.

[0048] Moreover, while various embodiments are shown in the drawings and described above, many other types of cup-shaped members may be used, as will be well understood by those skilled in the art. For example, the side wall of the cup-shaped member may have a tapered outer surface, or may be straight sided or have any other desired design.

[0049] Additionally, which the cup-shaped member is described above as being surrounded on all sides by bristle tufts, if desired the cup-shaped member may be only partially surrounded by bristle tufts. For example, if desired the side tufts 18B in FIG. 1 could be omitted.

[0050] Moreover, while heads for power toothbrushes have been described above, resilient members having the features described above may be used on manual toothbrushes, if desired.

What is claimed is:

1. A head for a toothbrush comprising:
 - a support member, a resilient member extending from the support member, and a plurality of tufts of bristles extending from the support member and at least partially surrounding the resilient member.
2. The toothbrush head of claim 1 wherein the resilient member comprises a cup-shaped member.
3. The toothbrush head of claim 1 wherein the resilient member comprises a fan-shaped member.
4. The toothbrush head of claim 1 wherein the resilient member comprises a textured member.
5. The toothbrush head of claim 1 wherein the head is configured for use on a power toothbrush.
6. The toothbrush head of claim 2 wherein the cup-shaped member comprises a resilient material.
7. The toothbrush head of claim 2 wherein the cup-shaped member includes a side wall that is substantially continuous.
8. The toothbrush head of claim 2 wherein the cup-shaped member includes a plurality of segments that define a discontinuous side wall.
9. The toothbrush head of claim 2 wherein the cup-shaped member includes a generally cylindrical side wall.
10. The toothbrush head of claim 2 wherein the cup-shaped member includes a generally conical or frustoconical side wall.
11. The toothbrush head of claim 2 further including a plurality of fin members extending inwardly from an inner surface of the cup-shaped member.
12. The toothbrush head of claim 1 wherein the resilient member includes a wavy edge.
13. The toothbrush head of claim 1 further including one or more inner cup-shaped members disposed concentrically within an open area defined by the resilient member.
14. The toothbrush head of claim 13 wherein the resilient member and inner cup-shaped members are comprised of segments that define discontinuous outer walls of the cup-shaped members.
15. The toothbrush head of claim 11 wherein at least some of the fin members converge to intersect at a central hub.
16. The toothbrush head of claim 15 wherein the central hub has a shape selected from the group consisting of cones, inverted cones, cups and cylinders.
17. The toothbrush head of claim 15 wherein the converging fin members increase in height with increasing radial distance from the central hub.
18. The toothbrush head of claim 11 wherein the fins have different lengths.
19. The toothbrush head of claim 11 wherein the fins have different thicknesses.
20. The toothbrush head of claim 11 wherein the fins have different heights.
21. The toothbrush head of claim 2 wherein the cup-shaped member defines an open central area having a depth of from about 2 to 5 mm.
22. The toothbrush head of claim 1 wherein at least some of the tufts have different heights.
23. The toothbrush head of claim 1 wherein the height of the bristle tufts is greater than the height of the resilient member.
24. The toothbrush head of claim 3 wherein the fan-shaped member includes a plurality of protrusions extending radially from a central hub.
25. The toothbrush head of claim 24 wherein the central hub is generally conical, cylindrical or cup-shaped.
26. The toothbrush head of claim 3 wherein the height of the bristle tufts is greater than the height of the fan-shaped member.
27. The toothbrush head of claim 4 wherein the textured member includes a plurality of individual elements extending from a common base.
28. The toothbrush head of claim 27 wherein said elements comprise protrusions selected from the group consisting of lamellae, nubs, and combinations thereof.
29. The toothbrush head of claim 4 wherein the textured member includes a molded element having an integrally molded surface texture.
30. The toothbrush head of claim 4 wherein the textured member comprises a resilient member formed of a material having a macroscopic surface texture.
31. The toothbrush head of claim 4 wherein the textured member comprises a resilient material.
32. The toothbrush head of claim 4 wherein the height of the bristle tufts is greater than the height of the textured member.
33. The toothbrush head of claim 1 wherein the resilient member comprises a material having texture-imparting particles embedded in its surface.
34. A head for a toothbrush comprising:
 - a support member,
 - a resilient member extending from the support member, the resilient member being selected from the group consisting of cup-shaped members, fan-shaped members, and textured members, and
 - a plurality of tufts of bristles extending from the support member and at least partially surrounding the resilient member.
35. A head for a toothbrush comprising:
 - a support member,
 - a resilient member extending from the support member, and
 - a plurality of tufts of bristles extending from the support member and at least partially surrounding the resilient member;
 the head being configured for use on a power toothbrush.

* * * * *